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CASE OF POST CARDIAC ARREST SURVIVAL FOLLOWING HYSTEROSCOPIC POLYPECTOMY: CASE REPORT

Anaesthesiology

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ABSTRACT

Hysteroscopy involves introduction of scope into uterine cavity through cervix. It is a popular minimally invasive procedure used for direct visualization of uterine cavity and is widely used for various diagnostic and theuraptic indications. Despite being a minimally invasive procedure hysteroscopy has its own unique set of complications. The overall complication rate of hysteroscopy is around 2 %.Various complications reported are uterine perforation, fluid overload, and infectious complications. Gas embolism is a hazardous complication of hysteroscopy and incidences of 10-15% have been reported in a number of fatal or near fatal cases. Embolism during operative hysteroscopy can be either air (atmospheric air) or gas (ingress of insufflating gas such as carbon dioxide or smoke from electrocautery). The most precarious hysteroscopic procedures associated with venous air embolism are intrauterine adhesiolysis, endometrial resection and myomectomy with a relatively lower complication rate for polypectomy. We report the case of a 35 year female known case of hypertension was posted for hysteroscopic polypectomy for infertility at a private hospital. Complications are to be kept in mind and possible precautionary measures are to be taken at all times.

KEYWORDS

Hysteroscopy, venous air embolism, Anaesthesia, intensive care unit, complications

INTRODUCTION:

Hysteroscopy is a commonly performed procedure for the diagnostic and therapeutic interventions in infertility evaluation. Although operative hysteroscopy is a low risk procedure and usually done in healthy patients, the association of venous air/gas embolism (VAE/VGE) has been a matter of serious concern. Embolism during operative hysteroscopy can be either air (atmospheric air) or gas (ingress of insufflating gas such as carbon dioxide or smoke generated during electro thermal procedure). Multiple fatal and nonfatal cases of embolism have been reported in the past with incidence of 10–50% . [1,2]

Various advantages can be enumerated such as short operative time, rapid postoperative recovery, and low morbidity. Overall hysteroscopy is regarded as a safe, minimally invasive procedure, but it can be associated with complications such as uterine perforation, fluid overload, and rare and lethal complications such as gas and venous air embolism, especially in operative hysteroscopic interventions.[3] In diagnostic hysteroscopy, the most commonly used distending media are normal saline (NS) and the earlier widely used carbon dioxide (CO_2) has now largely been replaced due to increased incidence of complications such as gas embolism. The incidence of this rare complication is 3/17,000 procedures.[4] Exposed large uterine veins are mainly the point of entry for gas or air during hysteroscopy.[3] It can be recognized by a decrease in oxygen saturation and sudden drop in end tidal CO_2 and may sometimes lead to severe organ failure and death.[5]

Case Report:

A 35 year female known case of hypertension was posted for hysteroscopic polypectomy for infertility at a private hospital. Patient was taken to operation theatre at 2:30 pm on 12 August 2023. Multichannel monitors were connected, iv line was secured, iv fluids started. Subarachnoid block was given and block was achieved after 7 minutes. Patient was stable and procedure was started. After 5 minutes into the procedure, patient complained of chest pain, dyspnea had abnormal body movements followed by bradycardia and fall in blood pressure and Spo2. Precordial auscultation revealed millwheel murmur and patient developed asystole. At the same time anesthetist noticed air bubble in the surgical field and whole of tubing and surgery was stopped immediately. Injection Atropine 0.6 mg and Injection Adrenaline 1 mg stat was immediately administered and 100% oxygen was given .CPR was started according to latest ACLS protocol and there was return of spontaneous circulation after 7 minutes. Patient was intubated and sent to SMHS ICU for further management and ICU care.

On 12 Aug on arrival to SMHS ICU, GCS: sedated, pupils: small size sluggishly reactive to light. Patient was coupled to mechanical ventilator on Volume control mode and standard care was started according to latest Post Cardiac Arrest Survival Algorithm. ECHO showed EF of 66% with no RA RV dilatation with no RWMA. CT Angio was normal. USG showed minimal pleural effusion with mild ascites ECHO showed EF 55% no RWMA , RA RV not dilated. Patient was started on Injection Pipercillin tazobactum 4.5 g iv tid and injection leetiracetam 500 mg bid and injection Enoxaparin 0.6 ml od.On 13 Aug patient became hemodynamically unstable and febrile and was started on minimal pressor support of nor adrenaline. Chest X ray showed consolidation patch on left side . Antibiotics were changed to Injection Meropenem 1 g tid and Injection Vancomycin 1 g bid. Injection Levofloxacin 750 mg was added. Fever was controlled with tepid sponging and Injection Paracetamol 1g tid.On 14 pressor support was tapered and patient became afebrile was put on SIMV mode of ventilator.On 15 extubation trial was given at GCS of E4VT M6. Extubation was uneventful and smooth. Patient was put on polymask 15litres per minute. Over 24 hrs oxygen therapy was deescalated and patient was maintaining saturation on nasal prongs with minimum oxygen requirement and was ambulatory and on full orals. On 16 Aug patient was discharged from ICU and sent to ward.On 17 Aug patient was discharged from ward on oral antibiotics and multivitamin and had no oxygen requirement.

DISCUSSION:

Hysteroscopy is the preferred method of diagnostic and therapeutic intervention for intrauterine pathologies. However, it may be associated with rare but serious complications such as venous air embolism (VAE), female transurethral resection of prostrate syndrome, fluid overload, uterine perforation, and hemorrhage.

Various causes for embolism during hysteroscopy can be smoke generated during the electro thermal procedure, CO_2 insufflation, or atmospheric air. In literature, many cases of embolism have been described with an incidence of 10%–50%.[6-8] The first case of gas embolism during hysteroscopy was reported in 1985.[9] It can be a dreaded complication even in healthy woman.[10] In our institute, we routinely gives spinal anesthesia for diagnostic hysteroscopy and

cystoscopy and general anesthesia with endotracheal intubation for operative laparoscopy and hysteroscopy. Early identification of fluid overload in operative hysteroscopy can be better done under regional anesthesia. However, there are no controlled studies comparing and analyzing various anesthetic techniques for operative hysteroscopy. Whatever may be the type of anesthesia used, it is important to follow the guidelines for the prevention of air/gas embolism during such a procedure. In the present case, the patient was posted for hysteroscopic polypectomy for infertility at a private hospital. Subarachnoid block was given and block was achieved after 7 minutes. Patient was stable and procedure was started. After 5 minutes into the procedure, patient complained of chest pain, dyspnea had abnormal body movements followed by bradycardia and fall in blood pressure and Spo2. Precordial auscultation revealed millwheel murmur and patient developed asystole.

During operative hysteroscopy, due to the increased volume of fluid used for distention and more extensive cervical dilatation, the risk of air embolism is higher. Cervical dilatation may cause a cervical laceration into which forced entry of air bubbles may lead to a pulmonary embolus.[11] In our patient, anesthetist noticed air bubble in the surgical field and whole of tubing and surgery was stopped immediately. Injection Atropine 0.6 mg and Injection Adrenaline 1 mg stat was immediately administered and 100% oxygen was given .CPR was started according to latest ACLS protocol and there was return of spontaneous circulation after 7 minutes. Patient was intubated and sent to SMHS ICU for further management and ICU care**.**

Echocardiography transtracheal or transesophageal echocardiography is the most sensitive method to detect gas bubbles. Gas bubble volume can be correlated with clinical presentation.[12] To analyze the incidence and hemodynamic significance of gas embolism during operative hysteroscopy, a study was done which observed a high frequency of gas embolism with a small but statistically significant rise in pulmonary artery pressure without right ventricular dysfunction. [13]

Desaturation and hemodynamic instability occurred in the present case 15 minutes after induction, and the possibility of a VAE cannot be ruled out. Hysteroscopy-related VAE is a relatively common occurrence, with a high reported incidence of 10–50%.[14] However, most of such VAE events are clinically insignificant, as the liver might be acting as a filter reducing the amount of air reaching the pulmonary circulation. The characteristic clinical features include decreased end-tidal carbon dioxide (EtCO2) concentration, desaturation, bradycardia, tachycardia, “mill wheel” murmur, bronchospasm, and respiratory and cardiac arrest. [15] Other characteristic clinical features include increased pulmonary arterial and central venous pressures, decreased blood pressure, electrocardiogram (ECG) changes, decreased arterial partial pressure of oxygen, and a widened gap between the arterial pressure of carbon dioxide (PaCO2) and EtCO2. Use of continuous EtCO2 has been recommended for hysteroscopy cases. [14,15] The authors have documented only desaturation, hemodynamic instability, hypercapnia (PaCO2 of 49 mmHg) with no reference to EtCO2 values, ECG changes, murmur, hypotension, or bradycardia at the time of the event. [16] The patient had bronchospasm, which can occur consequent to VAE and lead to increased peak airway pressures as noted in this case. On these grounds, we would put forward the argument that the present scenario could well be a non-fatal sequel of VAE rather than fluid overload.

Proposed treatment:

Treatment of this serious complication includes early recognition. If the anesthesiologist alerts the surgeon of the cardiovascular changes previously described, the surgeon can immediately cease the operation and close the point of air entry, thereby minimizing further air entrainment. [17] The patient should be placed in a left lateral position (Durant's maneuver) to elevate the right ventricle above the left ventricle and therefore minimize the risk of paradoxical embolism, [18] or alternatively be placed in reverse Trendelenburg to minimize any further air entrainment. [19] 100% oxygen should be administered and nitrous oxide anesthesia should be ceased. [17] Air retrieval should be considered via insertion of a central venous catheter or direct cardiac aspiration. [17,20,21] One case report suggested performing pericardial thumps and cardiac massage to facilitate the breaking up of large gas bubbles. [20] Finally, inotropic support and cardiopulmonary resuscitation (CPR) may need to be commenced, with patient's successfully resuscitated necessitating ICU admission. [17]

Prevention:

Mortality can be as high as 46% with venous air embolism. However a vigilant anesthesiologist's timely intervention, termination of surgical procedure at right time and thus terminating the continued entrainment of air, smoke or gas bubbles can help decrease morbidity and mortality. As with any potential complication of a procedure, treatment of air or gas embolism starts with prevention and early detection. Preventive steps need to be taken include: -Fluid bottles should be kept at a height of less than 1 meter above patient -Use of external pressure infusers should not be encouraged-Before every case change the tubing and hysteromat set to confirm that it is free of air bubbles-Intrauterine pressure should be kept at less than 100 mmHg during the procedure-Not to insert and remove the hysteroscope repeatedly-Confirm the availability of resuscitation equipments and drugs prior to procedure-Dilatation and curettage should be performed after hysteroscopy if they are to be performed in conjunction with it.

Management includes:-

An immediate halt to surgery and deflation of uterine cavity.-Close the air entry port.- The woman can be placed in left lateral decubitus position (Durant's maneuver)-100% oxygen to be given.-Air removal should be considered through the insertion of central venous catheterization or direct cardiac aspiration.-Cardiac massage to break large air bubbles.- Inotropic support and cardiopulmonary resuscitation.

CONCLUSION:

Venous air embolism is a fatal complication during operative hysteroscopy .As with any other complication prevention is essential and needs input from all members of surgical team. Strict vigilance along with adequate monitoring is of paramount importance in the early diagnosis and initiation of management. Of facilities is available use of advanced monitoring such as transthoracic 2D ECHO can help in confirming the diagnosis.

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