Case Report

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Anesthetic Considerations for a Patient with Prosthetic Valves, AF, and PPM Undergoing Surgery for Misplaced Dental Implant in Paranasal Sinuses: A Case Report

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Abstract

Managing pts with DVR, PPM, AF and HTN is a challenge to anesthesiologist because of risk due to endocarditis, bleeding, thromboembolism, malfunction of pacemaker and MI. Displacement of dental implant in paranasal sinus is not very rare but it primarily occurs in patient with severe pneumatization of maxillary sinus/or defect of alveolar process. The present case report highlights the anaesthetic management of a patient with double valve replacement (DVR), atrial fibrillation (AF) and permanent pacemaker (PPM) for misplaced dental implant in the paranasal sinuses. Successful non-cardiac surgeries in patients who have heart disease depends on good preoperative assessment, intraoperative and post-operative management.

Keywords: Double Valve Replacement; Atrial Fibrillation; Permanent Pacemaker; Paranasal Sinuses; Anesthesia.

Abbreviation: DVR: Double Valve Replacement

AF: Atrial Fibrillation

PPM: Permanent Pacemaker

HT: Hypertension.

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INTRODUCTION

It is a challenge to administer anesthesia to people who already have cardiac problems. Patients with prosthetic heart valves are a challenge to any anesthesiologist due to the risk of infective endocarditis, bleeding and thrombosis. During the peri-operative phase, these individuals are at higher risk for myocardial is chemia, myocardial infarction (MI), conduction disturbances, morbidity, and mortality. Identification of risk factors, pre-operative assessment and optimization, medical therapy, monitoring, and the selection

of the proper anesthetic method and medications are all necessary for the care of these patients. Pre-operative evaluation serves the purposes of assessing a patient's present medical condition, providing clinical risk profiling, deciding on additional testing, treating modifiable risk factors, and planning the management of cardiac illness during the perioperative period.[1]

Recent myocardial infarction, congestive heart failure, prosthetic valves, atrial fibrillation, peripheral vascular disease, angina pectoris, diabetes mellitus, hypertension, hypercholesterolemia, dysrhythmias, age, renal dysfunction, obesity, lifestyle choices, and smoking are risk factors that affect peri-operative cardiac morbidity. The objectives of anaesthesia continue to be stable hemodynamics, preventing myocardial infarction, monitoring for thromboembolism, treating it if it occurs, maintaining normothermia, and avoiding substantial anaemia.[2]

Foreign bodies in the paranasal sinuses are still a rare clinical disease, and removal procedures are much more difficult. Iatrogenic reasons account for 60% of paranasal foreign body causes, while accidental causes account for 25%. Various dental, ophthalmology, and otorhinolaryngological procedures are among the iatrogenic causes. Any prior experience with any of the aforementioned procedures should raise concerns about a paranasal foreign body. The maxillary sinus is the one that is most frequently affected (75%) followed by the frontal sinus (18%).[3]

Dental fillings, fractured parts of tooth and bone, pieces of glass, stones, bullet fragments etc. can all be considered foreign bodies. Whatever their origin or nature, foreign materials in the maxillary sinus should be feared. Unilateral unexplained chronic rhino sinusitis may also raise clinical suspicion. Radiological results serve as the basis for the diagnosis. There is a wide range of these foreign bodies, but those with dental origin tooth roots, burs, impression materials, root filling materials, needles, and dental implants take precedence over all others. Rarely, however, they may be related to blast wounds and piercing injuries.[4] The removal of paranasal foreign bodies is never easy. But with the development of advanced diagnostic techniques and endoscopic assisted procedures, such surgeries can be performed safely with relative ease.

One of the most frequently performed treatments for the recovery of a foreign body in the maxillary sinus is functional endoscopic sinus surgery (FESS). In patients with chronic polypus rhino sinusitis and medically refractory chronic rhino sinusitis, it has a high success rate (around 90%) for symptomatic relief. To achieve success, proper anaesthetic management is crucial. Local vs. general anaesthesia, laryngeal mask airway vs. endotracheal tube vs. inhaled vs. total intravenous anaesthesia (TIVA), and other anaesthesia procedures need to be taken into account.[5] The anesthetic strategy should be customized based on the patient's comorbidities, the anesthesiologist's and surgeon's expertise, and the patient's preferences. The specific objectives of anaesthesia are to provide the best surgical field feasible and to maintain a stable cardiovascular and respiratory status during the surgery, emergence of anesthesia and upon recovery.

The present case report highlights the anaesthetic management of a patient with double valve replacement (DVR), atrial fibrillation (AF) and permanent pacemaker (PPM) for misplaced dental implant in the paranasal sinuses.

CASE REPORT

A 76 yrs old patient came to ENT clinic with complains of headache, facial pain and foul smell with occasionally blood stained discharge from nasal cavity. His pain was located at upper face and gums. Patient had a dental implant procedure 2 years ago under local anesthesia. His signs and symptoms were started one month ago after he missed the step of stairs and fell down. To rule out the cause of his current condition, he was ordered blood tests and CT brain with sinus.

His blood test result revealed normal except for mild leucocytosis and CT scan result showed mucosal thickening of the left maxillary sinus and spreading its to the anterior ethmoids and frontal sinus. In CT scan a curl or deform like structure is seen near the middle Concha suggesting foreign body. This CT scan finding suggested misplaced dental implant in left maxillary sinus as patient had history of falling dental implant. Therefore, patient was advised for Fiberoptic endoscopic sinus surgical procedure (FESS) to remove the foreign body from left maxillary sinus.

In view of patient medical history, he is known case of hypertension and atrial fibrillation. He had surgery for double valve (mitral and aortic valves) replacement 10 years ago and implanted permanent pacemaker for complete heart block. After valvular surgery, he was prescribed antihypertensive and anti-coagulant medications but patient himself reported that he is no complaint with his medications. Therefore, cardiology consultation

was resorted to evaluate his base line cardiac function, risk stratification and pre-operative optimization.

His pre-operative echocardiography report revealed ejection fraction of 40% and grade II diastolic dysfunction with confirmation of placement of prosthetic valves and pacemaker. Patient was commenced Edoxaban 60 mg once daily orally and advised to stop it 48 hours before surgery.

We also consulted pacemaker physiologist to assess the pacemaker function and battery life preoperatively and reported well functioning. His pre-operative chest X-ray report revealed cardiomegaly with implanted intact pacemaker leads. Cardiologist advised to change the mode of pacemaker to VVIR from DDD mode. His pre-operative ECG (Fig. 1) report showed ventricular

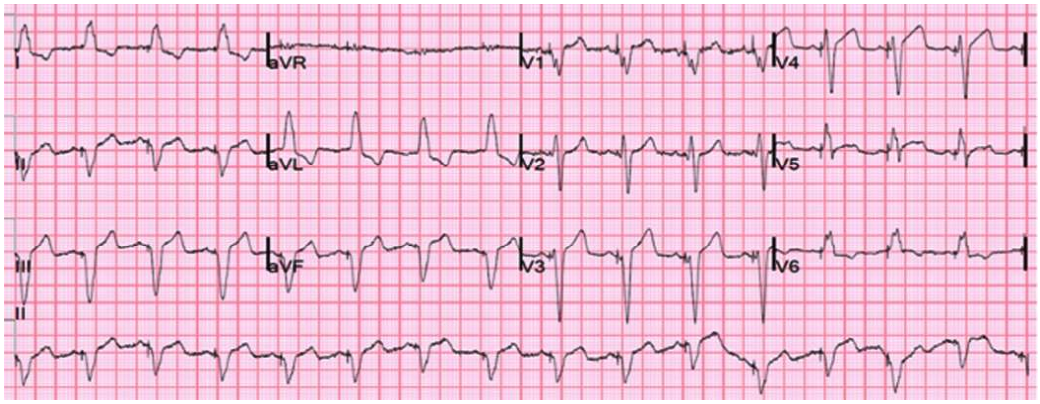

Fig. 1: Electrocardiogram

pace rhythm.

During pre-operative anesthesia assessment of patient, the risk and benefit associated with general anesthesia for removal foreign body in view of multiple co-morbidities were discussed with patient and his relatives and written consent was obtained. Also, post-operative HDU bed was arranged for overnight observation.

On the day of surgery, quick review of patient fasting status and vitals were checked in pre-operative area. Pre-operative patient weight was 58 kilograms. Pre-operative anesthesia preparation, including emergency medication, airway trolley, crash cart, pacemaker machine and defibrillator were kept ready. In addition, Patient received ampicillin 2 grams I.V for prophylaxis of Subacute bacterial endocarditis. After taking patient inside the operation room, essential monitors along with external pacemaker pads were connected. Right radial artery cannulated with use of ultrasound for continuous blood pressure monitoring and cardiac output monitoring [Edwards]. Deep vein thrombosis prophylaxis with pneumatic calf compression was connected. His base line ABG was done and it's reported in accepted range.

After pre-oxygenation for five minutes, patient was induced with fentanyl 50 micrograms, propofol 60 miligrams and intubation done with cuffed ETT 7.5 size after rocuronium 40 miligrams. Intra-operative anesthesia was maintained with sevoflurane and fentanyl 25 micrograms. His vitals were stable through out the procedure except for 2 episodes of mild hypotension, it was managed with ephedrine 5 miligrams bolus. Foreign body was removed from left maxillary sinus via maxillary antrostomy (FESS procedure) and nasal packing along with sterile dressing were done by surgeon. Antiemetic prophylaxis, dexamethasone and ondansetron were given before the end of surgery. Paracetamol 1 grams and Parecoxibe 40 miligrams were given for post-operative pain. Procedure lasted for 1 hour and emergence was smooth after muscle relaxant reversal with sugammadex 120 miligrams. Observed the patient for 15 minutes inside the operation room after extubation and later shifted to post anesthesia care unit. In PACU, patient kept at 25 degree head up position with essential monitor and calf compression were connected and started oxygen 2 liter per min with face mask for 45 minutes. The pace maker mode was changed back to DDD mode after surgery in PACU as per cardiologist advised.

Patient was shifted to HDU from PACU for over night observation. His vitals were stable in HDU except for slight increase in blood pressure. It was managed with small dose of short acting beta blocker. Cardiology consultation was taken in HDU and follow-up consultation was arranged with cardiologist in a month time. His anti-hypertensive

and anti-coagulants medications were restarted in HDU. Patient was discharged home on 2nd post-operative day with Augmentin 1000 mg twice daily for 5 days. This case was performed at a private hospital in India.

DISCUSSION

In recent decades, the rehabilitation of patients who are partially or completely edentulous has been a wide spread practice, with consistent long-term effects.[6]

Alveolar ridges that are edentulous may not be suitable for implant implantation. The paucity of bone in the posterior edentulous maxilla in particular, which is a result of alveolar ridge resorption and/or maxillary sinus pneumatization, presents a problem for the oral surgeon. Short implants or maxillary sinus floor elevation in conjunction with, or after, the placement of dental implants are well researched and effective solutions to these issues.[7] These procedures should make it safe to place implants in the posterior maxilla, but sporadic reports of implant displacement or migration in the paranasal sinuses due to surgical in experience, perforations during sinus wall lift procedures, implants placed in the excessively pneumatized maxillary sinus without elevation of the sinus floor, false grafting technique, and inadequate anatomical knowledge have been made. Implant migration in the sinuses can be accompanied by oro-antral communication and/or infection that may affect the maxillary sinus as well as the ethmoidal, frontal, and sphenoid sinuses. However, implant migration in the sinuses may not be followed by pertinent signs and symptoms of infection.

To avoid these issues, these displaced foreign bodies need to be removed as quickly as possible.[8]

The Cald well Luc approach and functional endoscopic sinus surgery (FESS) have been suggested as the two main treatment options for the removal of misplaced implants in the sinuses and to manage the accompanying infection problems. FESS is the recommended treatment option because it enables the removal of displaced implants, treatment of paranasal sinusitis, and restoration of appropriate patency of the natural maxillary ostium with a minimally invasive technique.[9]

Surgery on a cardiac patient is quite difficult for the anesthesiologist. Patients with artificial heart valves must have their cardiac condition evaluated for valvular function, residual pathology, infective endocarditis, and functional status before undergoing non-cardiac surgery.

Anticoagulation status, bleeding risks, and preparation for intraoperative anticoagulant reversal are also evaluated.

Anticoagulation should not be stopped during the perioperative period since it increases the risk of life-threatening thrombosis while continuing it increases the risk of major bleeding following surgery. Studies have indicated that individuals with mechanical valve prosthesis who stop taking warfarin run a risk of thromboembolism of between 1% and 20%. To assess a patient's present medical condition, offer clinical risk profile, decide on additional testing, address modifiable risk factors, and arrange the care of cardiac emergencies during the perioperative period, a through pre-operative evaluation is necessary.[10] Additional testing must be requested if needed.

Originally performed under topical anaesthesia and sedation, FESS is now frequently performed under general anaesthesia to accommodate more complex surgical requirements. Avoiding tachycardia and extremes in blood pressure, both of which have a negative impact on the balance between oxygen supply and demand, is a crucial component of general anaesthesia. Depending on the procedure and the patient's needs, general or regional anaesthesia can be used alone or in combination as a part of a balanced method. These individuals may be given preanaesthetic medications such as short acting benzodiazepines as anxiety might result in tachycardia and hypertension. The primary objectives are to maintain hemodynamic stability and reduce the hemodynamic reactions to intubation and surgical stimulation. The majority of induction drugs are myocardial depressants, which result in decreased systemic vascular resistance and more venous pooling. The minimal effect on the cardiovascular system makes Etomidate preferable. A substitute is propofol. When compared to volatile medications, propofol may have reduced intraoperative blood loss, according to preliminary research. Propofol has the benefit of being ableto quickly suppress the sympathetic reaction to endotracheal tube insertion and periods of surgical stimulation, in addition to lowering systolic blood pressure through a reduced drop in systemic vascular resistance. Additionally, propofol lowers cerebral metabolism, which results in decreased cerebral blood flow due to autoregulation. This enhances surgical vision by reducing flow via the ethmoidal and supraorbital arteries, which supply the ethmoid, sphenoid, and

frontal sinuses.[11]

The surgical field and blood loss during FESS have been compared in two published narrative reviews. While Baker *et al*.[12] came to the conclusion that propofol general anaesthesia enhanced the surgical field but did not reduce surgical blood loss, Amorocho *et al*.[13] found that propofol general anaesthesia improved the surgical field and reduced blood loss. Utilizing medications that can lessen haemodynamic reactions, such as opioids, lidocaine, or induction agents, can help prevent the stress response to laryngoscopy. Either volatile anaesthetics like isoflurane, sevoflurane, or desflurane are used to maintain anaesthesia, or total intravenous anaesthesia utilizing propofol, opioid analgesics, and muscle relaxants. Cardioprotective benefits are provided by volatile anaesthetics. To ensure a smooth extubation, avoid sympathetic stimulation. Opioids and beta-blockers are effective in achieving this. Statins, beta-blockers, and anti-failure drugs must be continued through out peri–operative period. Beta-blockers are known to reduce cardiac contractility and sympathetic tone. The three most often used beta-blockers are metoprolol, atenolol, and bisoprolol. 50–70 beats per minute is the desired heart rate.[14] A centrally acting alpha adrenergic agonist is clonidine. It lowers hypertension, tachycardia, and norepinephrine release related to surgical stress and is used as a sedative, anxiolytic, and analgesic. INR must be less than 1.5 in order to proceed with surgery, and unfractionated heparin must be stopped 3-6 hours before surgery and restarted within 6-12 hours after it is finished in order to reduce the risk of thrombosis. Warfarin should be switched to unfractionated heparin at least 4-5 days before surgery. Monitoring after surgery is crucial. In the ICU, serial 12 lead ECG and troponin readings are helpful. All patients with artificial heart valves should get a prophylactic antibiotic against infective endocarditis.

The care of post-operative pain is another crucial factor. In order to lessen stress, unfavorable hemodynamics, and hypercoagulable states, effective pain management is essential.[15] Although most cardiac events occur during the first 48 hours, delayed cardiac events can still happen within the first 30 days and may be caused by additional stress. Extubation-related post-operative stress, pain, sepsis, haemorrhage, anaemia, and respiratory issues can all increase the heart's work load and should be avoided and managed.

CONCLUSION

Successful non-cardiac surgeries in patients who have heart disease depends on good perioperative management. In addition, each patient's demands, surgical requirements, and available facilities must be considered when tailoring the approaches.

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