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Short Communication

Misplacement of Pacemaker Leads: How to Avoid and how to Approach?

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ABOUT THE STUDY

Misplacement of a permanent pacemaker lead in the Left Ventricular (LV) can lead to a variety of complications, including damage to the heart muscle, arrhythmias, blood clotes and cerebrovascular events. It is recommended to use the fluoroscopic 40° Left Anterior Oblique (LAO) view during implantation. That view clearly defines the interatrial and interventricular septum. Right bundle branch block pattern on ECG is an important clue to suspected misplaced lead. In addition to the Postero-Anteiror (PA) projection of X-ray, the Latero-Lateral (LL) projection provides a clearer view of lead malposition. In the LL view, the tip of an incorrectly positioned LV lead is characteristically directed toward the spine. If diagnosed soon after implantation, percutaneous lead extraction can reduce the risk of future thromboembolic events without the need for lifelong anticoagulation. It should be noted that in cases with a lead in the LV for a long time, lead removal is not the primary recommendation. Patient-based approach should be fundamental.

Permanent pacemaker leads are thin wires that are inserted into a patient's heart to deliver electrical stimuli to the heart muscle, typically in order to treat a heart rhythm disorder. In most cases, the leads are placed in the right atrium and the right ventricle of the heart. However, it is possible for a lead to be misplaced and end up in the left ventricle instead. Lead migration from the right ventricle through the interventricular septum is the most frequent cause of misplaced right ventricular leads into the left ventricular chamber. In the event of cardiac resynchronization therapy, an epicardial left ventricular lead put into a branch of the coronary sinus can occasionally perforate into the endocardium and then into the Left Ventricular (LV) chamber. Additionally, an atrial septal defect or patent foramen ovale may cause the lead to pass to the left side of the heart.

Misplacement of a permanent pacemaker lead in the LV can lead to a variety of complications, including damage to the heart muscle, arrhythmias, blood clotes and other problems. It may cause a cerebrovascular obstruction, which is a blockage in a blood vessel in the brain. This can cause serious consequences such as stroke or other brain injuries. If a patient presents with weakness or numbness on one side of the body, difficulty speaking or understanding language, and changes in vision or balance and has a permanent pacemaker, it is important to consider the possibility of a misplaced pacemaker lead as a cause.

It is important to properly position and secure pacemaker leads to minimize the risk of complications. This can be done during the pacemaker implantation, which should be performed by a trained and experienced healthcare provider. It is recommended to use the fluoroscopic 40° LAO view during implantation. That view clearly defines the interatrial and interventricular septum. Right ventricular leads that are septally positioned may appear to approach the spine in this view. A steeper left anterior oblique projection, where the lead should be visible to be away from the spine, confirms a right ventricular position [1].

Electrocardiogram (ECG) is very important in detecting misplaced pacemaker lead. Right bundle branch block pattern on ECG is an important clue to suspected misplaced lead [2]. Imaging methods are also a valuable aid in determining post-operative lead malposition. The first of these is chest X-Ray imaging. Standard Postero-Anterior (PA) chest X-ray may not clearly show the malposition because of the left and right ventricles are in the same plane [3]. In addition to the PA projection, the Latero-Lateral (LL) projection provides a clearer view of lead malposition. In the LL view, the tip of an incorrectly positioned LV lead is characteristically directed toward the spine [4].

The management of patients with misplaced electrodes in the LV is controversial. Its management depends on implantation time, clinical picture, and occurrence of complications. If diagnosed soon after implantation, percutaneous lead extraction can reduce the risk of future thromboembolic events without the need for lifelong anticoagulation. If a permanent pacemaker lead has been mistakenly placed in the left ventricle, it is important to remove it as soon as possible in acute cases to prevent further complications. This can typically be done through a procedure called lead extraction, which involves using specialized tools to remove the lead from the heart [5]. It also may be necessary to surgically remove the lead and reposition it in the correct location. This can be a complex and risky procedure, as the lead is often embedded in the heart tissue and may be difficult to

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remove. In some cases, it may be necessary to implant a new lead or replace the entire pacemaker system.

It should be noted that in cases with a lead in the LV for a long time, lead removal is not the primary recommendation [6]. Treatment for a cerebrovascular obstruction due to a misplaced pacemaker lead may involve removing the lead and replacing it in the correct position. This may require surgery.

CONCLUSION

In some cases, other treatments such as medications or procedures to dissolve or remove the blockage may also be necessary. It is also important to monitor the patient carefully after the lead has been removed, to ensure that there are no lingering complications or problems. It may be necessary to replace the lead with a new one, either in the same location or in a different location in the heart. Patient-based approach should be fundamental.

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