

ORIGINAL ARTICLE

INFECTION OF PERMANENT PACEMAKER'S POCKET, WHAT DO WE DO?

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Background: With increased rate of permanent pacemaker's (PPM) implantation, the rate of complication also increased many folds. Infection in pacemakers is one of the dreaded complications which need a multidisciplinary approach in its management. **Methods:** All patients with permanent pacemakers, who presented with infection of device, were admitted in our unit. The infected device was explanted and wound left open. The same device was used as a temporary pacemaker with a new PPM screwing lead from internal jugular approach. Once the infection was under control, a new device was implanted on the other side and temporary wire (PPM screwing lead) pulled out. Wound on both side closed and patient kept on antibiotics for a week. **Results:** Total 10 cases of infected device received. Single chambers devices with infection were six and dual chamber pacemakers were four. One case with infection had tine lead and nine patients presented with screwing leads. Male and female ratio was 2.3:1. All leads were explanted in our department with conventional gadgets using rotation and traction maneuvers. Culture sensitivity in all cases remained negative. Patients were kept on broad spectrum antibiotics till the wound was clear. One patient had small pericardial effusion soon after explantation of tine lead, which was treated conservatively. No other major or minor complication documented. **Conclusion:** Scrupulous planning and preparation before system extraction and later on new Cardiac implantable electronic device re-implantation is essential for better patient outcome.

Keywords: Cardiac implantable electronic device; Permanent pacemaker; PPM; Internal jugular approach; Temporary pacemaker; TPM

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INTRODUCTION

With universal epidemics of implantation in cardiac devices all over the world,^{1,2} the complication rate related to device implantation also increased many fold.³ Infection of Cardiac implantable electronic device (CIED) represents a very horrible situation.^{4,5} Though with improvement in sanitation, sterilization and implantation techniques, the rate of infection has decreased all over the world.⁶ but still this dreaded complication pops up not very infrequently in developing countries. Once there is infection, early diagnosis can make a great difference in terms of survival⁷. Management of CIED infection is a multidisciplinary task.^{8,9} Antibiotics and conservative approach (i.e. without CIED system removal) are not sufficient to correctly and definitively treat this condition.^{10,11} Although complete removal of all hardware is certainly the best way to deal with device infections but lead extraction is a complex procedure that carries its own risks. After explantation patients are kept on antibiotics according to the local protocol and report of culture sensitivity to eliminate the source of infection from the site of extraction and to treat possible bacteremia as will. Therefore, the patient needs a reasonable period before a new device is implanted. But the same side still carries high risk of infection for the new device one hand. On the other hand, the venous access is not very easy on the

same side due to excessive fibrosis and stenosis of veins due to the previous implantation. Therefore, the new device is implanted on the opposite side most of the time after a couple of weeks. However, patients cannot be left without pacemakers in the window period between explantation and next re-implantation; therefore, temporary pacemakers (TPM) are implanted in this window period. However, TPM are sometimes associated with significant morbidity and mortality which needs special consideration.¹²

Temporary wire carries high risk of infection¹³ and at the same time they cannot be fixed inside the heart chambers; therefore, there is a potential risk of dislodgment which can endanger the life of the patient. Temporary wires are structurally stiff and the temporary pacing devices are relatively heavy weight therefore they are unbearable for very long period. Also, there is a risk of Phlebitis and Deep Vein Thrombosis.¹³ Retroperitoneal hemorrhage (RPH) is the most serious complication of femoral vein catheterization.¹³

To minimize the risk of complication from TPM the permanent device can be used as TPM in infection of devices.

MATERIAL AND METHODS

The study was conducted from June 2010 to April 2018 in the cardiology unit of Hayat Abad Medical

Complex Peshawar. All patients with permanent pacemakers, who presented with infection of device, were admitted in our unit. After initial workup of blood chemistry and swab for culture/sensitivity from the site of infection, they were started on broad spectrum antibiotics according to the protocol of the department. The antibiotic course was readjusted later on the basis of culture and sensitivity report.

Once the total leukocyte count (TLC) was in normal range, patient was brought to the catheterization laboratory. After informed consent the infected site was infiltrated with local anesthesia. A temporary wire was passed from the femoral vein and temporary device attached. The infected device explanted. The Leads of infected device was explanted with the conventional gadgets using rotation and traction maneuvers. The explanted device was washed with saline and pyodine.

The internal jugular vein on the opposite site was accessed and a peel able sheath was placed in situ by seldinger technique. A fresh screwing lead of permanent pacemaker passed from this site and fixed inside the right ventricle apex. The other end of the lead was brought out from the skin and the sheath was peeled. Lead was fixed with skin and the explanted battery attached. The battery also fixed with skin above the right shoulder using 1/0 silk. The femoral lead pulled out and hemostasis secured. The infected area debrided thoroughly, washed with saline and pyodine and left open. The wound was daily irrigated with saline, pyodine and hydrogen peroxide. After detail discussion of the post operation care, and according to the wish of the patient, either he was sent home or kept in hospital. Patients remain on antibiotics during the entire period. Once the wound was clear from infection, then a new device implantation was planned. Patient was brought to laboratory and new device implanted on the opposite side to the previous permanent device. The wire and device which was acting as TPM were pulled out. The wound of the previous device is stitched with secondary suturing. Patients remain on antibiotics for a week after the new device was implanted. Stitches removed after 10 days.

RESULTS

Total 1670 patients received pacemakers in the study period. First time devices implantations were done in 1535 (87.1%) patients. Box replacement was done in 70 (4.2%) cases for battery drain. Forty-one (2.5%) cases came with displaced leads and were successfully repositioned. Eighteen patients came for explantation and replacement of devices for reasons other than battery depletion. Out of these 18 cases, there were 10 (0.6%) cases with infection of the implantation site. Seven male patients and 3 female

patients were seen with infection in the study period. Age of the patient ranged from 23 to 80±16.35 years. Six Single chambers devices and four dual chamber pacemakers presented with infection. One case with infection had tine lead and nine patients presented with screwing leads. Culture sensitivity in all cases remained negative. One patient had small pericardial effusion soon after the explantation of tine lead which was treated conservatively. No other major or minor complications were documented during the study period. The data so collected was analyzed on SPSS version 22 for frequency of this dreaded complication. Over all the rate of infection in our devices remains very low that is 0.6%.



Figure-1: Infected ppm box: pus dribbling out from site of erosion

DISCUSSION

Infection in PPM can only be treated effectively with multi dimensional approach.^{8,9} It involves the microbiologist, pharmacologist, the attending physician, intervention cardiologist and cardiac surgeon at time.¹⁴ Though, some people have reported a very conservative approach to deal with this complication.^{15,16} The literature in those cases recommends local irrigation, debridement and injectable antibiotics for infection of the devices.^{15,16} But the long term results with conservative management are not promising.¹⁷ Therefore, instead of conservative approach, our routine approach is, to remove all the hard ware including the obviously looking non-infected materials, daily dress and clean the area with hydrogen peroxide and pyodine. Patient remains on broad spectrum antibiotic or on specific antibiotic regimen according to the culture/sensitivity report and once the area is clear of any residual infection the new device implantation is planned. However, in this window period the patient cannot be left uncover without a device. Therefore, patients remain on temporary pacing wire.

Temporary pacemaker by itself carries a lot of morbidity.¹⁸ The device size is cumbersome. The wire can easily be dislodged which will need readjustment under fluoroscopy and can give rise lethal situation at times. The hard nature of the wire is uncomfortable for the patient on one hand and can perforate the thin wall right sided chamber.¹⁹ Infection with temporary wire is another potential complication.²⁰ The rate of infection increase many fold if it is passed from the femoral route or the wire stay for long period.²¹ Since these wire needs to be retained till the infection is clear, this can badly interfere with the freedom of the patient particularly from femoral route. The subclavian vein is the next more suitable vein to be used for TPM, but it cannot be used on the infected side but also the opposite side needs to be preserved for next implantation. So, the only vein left is the internal jugular. But the traditional TPM wire is very uncomfortable at this site due to its stiffness and also there is an issue of stability because the neck is the most mobile structure. Patient's neck movement become very restricted in these cases and repeat manipulation are frequently needed for dislodgment.

Therefore, we started using the permanent ventricular screwing lead as TPM wire and the same permanent pulse generator which is explanted from the same patient, as TPM device using the internal jugular vein as the route of implantation. It has a number of advantages over the conventional TPM wire. It has a soft structure, short length and very flexible. This makes it very friendly to the patient. There is screwing mechanism on both ends which add to stability of the wire. The battery is having a small socket from where it can be attached with the skin without fear of falling. Some operators just bring out the battery leaving the same lead in situ and attach the battery with the skin on the same side. Once the infection site is clear they implant the new device on the other side and then pull out the old hardware. Though it may be a viable choice but in the presence of the same hardware on the same side, absolute sterilization is a question mark. It will also prolong the antibiotic course. Daily manipulation of the wire while dressing the area can lead to bacteremia and transfer of infection to the myocardium or lead endocarditis. Therefore, pulling out the whole assembly and thoroughly debriding the slough and implant a new wire as TPM from the other side till the infection is absolutely clear is a cost-effective approach in this dreaded complication.

CONCLUSION

An infection poses a severe burden on patients, lead to significant health care costs and lengthy hospital stays, and may also increased the rate of mortality.

Once there is infection, early diagnosis can make a great difference in terms of survival. Management of CIED infection is a multidisciplinary task. Apart from suitable antibiotics and surgical debridement the explantation of the device is the main stay of care. However, it should not be at the expense of patient freedom and increased cost and prolonged hospital stay.

AUTHORS' CONTRIBUTION

BS: Conceptualize, Data collection, literature review, analysis and script writing. CH: Review.

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