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# Psychopathology associated with cardiac pacing in Tanzania: A case series

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## Abstract

Emotional disarray linked to interventional procedures may potentially aggravate previous psychiatric conditions or even precipitate new psychopathologies. Despite of the well-known deleterious impact of mental health disorders on cardiac outcomes, psychological disturbances are relatively understudied yet of vital importance to the overall health of post-pacing patients. In this case series we present a spectrum of mental illnesses observed in a cohort of patients who underwent permanent pacemaker implantation in Tanzania's national referral cardiac centre. Five individuals of African origin aged between 58 and 81 years presented to Jakaya Kikwete Cardiac Institute with clinical conditions warranting permanent pacemaker implantation. All five denied prior history of mental illness, however, after thorough psychiatric reviews; organic brain syndrome, panic disorder, brief psychotic disorder, adjustment disorder and major depressive disorder diagnoses were reached. All five were successfully channeled for medical psychotherapy. To conclude, this case series illustrates variable consequences of poor psychological adaptation to implantable cardiac devices, and it underscores the importance of continued psychological evaluation to such patients.

## Keywords

Mental illness, psychopathology, pacemaker, cardiac implantable devices, bradyarrhythmia

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## Introduction

Since its introduction over five decades ago, implantation of permanent pacemakers whose primary aim is to eliminate symptoms resulting from heart automatism functioning syndromes has improved health-related quality of life (HRQoL) and survival worldwide.[1,2] With an estimated global prevalence of 0.04% and over 2.5 million deaths annually due to lack of access to pacing services, bradyarrhythmias constitute an important epidemiological and global health problem.[3] The situation is even worse in the developing world, particularly sub Saharan Africa (SSA) where literally a third of the countries in the region lack cardiac pacing services.[4,5] Though the full spectrum is poorly characterized, the growing burden of arrhythmias in SSA appear to be intertwined and in sync with the ongoing rapid epidemiological transition besides the upsurge of cardiovascular diseases in the region. Furthermore, adhesion to good practice and guideline-directed management of arrhythmias in SSA remains a challenge that is largely attributable to the treatment (i.e. deficiencies in skilled personnel, basic infrastructure and ablative therapy) and training (i.e. inadequate access to formal electrophysiology capacity development) gaps.[6,7]

It is apparent that chronic diseases provoke significant distress and consequently necessitate modification in various life domains across the disease trajectory course.[8] Irrespective of their baseline mental status, psychological adaptation after pacemaker implantation could be challenging to patients. The body of literature is evident for a diversity of psychopathology ranging from anxiety symptoms to

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suicidality amongst post-pacing patients.[9–24] However, owing to their complexity, clinicians tend to concentrate mainly on the technical aspects of pacemaker function and usually ignore or are unaware of the potential psychological distress.[11,25] Moreover, it is a difficult endeavor to predict which patients may succumb to psychological disturbances pre or post pacing. As mental health disorders are seldom evaluated before pacemaker insertion and since coexisting psychopathology is not a systematic contraindication to implantation, post pacing psycho-surveillance is indispensable. In spite of the increasing frequency of pacing procedures in SSA, there is a paucity of data on the concomitant psychopathology. In this case series we present a spectrum of mental illnesses observed in a cohort of patients who underwent permanent pacemaker implantation in Tanzania's national referral cardiac centre.

## Cases' descriptions

*Case 1*: A 58-year-old male, known hypertensive for 21 years presented with a history of recurrent vertigo for 3 months and subsequently underwent dual chamber permanent pacemaker implantation due to extreme bradycardia. During the clinical interview, he denied family or personal history of mental illness and an up-to-date mental status examination (MSE) was deemed stable. Moreover, his vital signs were blood pressure (BP) 143/76 mmHg, pulse rate (PR) 28 beats/min, temperature 36.8°C, respiratory rate (RR) 15 breaths/min, and saturation of peripheral oxygen ($SpO_2$) 97%. During a follow-up outpatient visit (3 months later), patient reported that soon after implantation he started feeling anxious due to the thoughts of having a pacemaker on his heart, 'I survive because of this battery' and thus his heart may stop suddenly and succumb to death. These anxious thoughts were intermittent and characterized by trembling, occasional headaches, dizziness and chest pain. About a month later he experienced persistent feeling of sadness almost every day and this was accompanied by loss of interest in pleasurable activities, poor appetite and gradual weight loss, fatigue, hopelessness, inability to concentrate and terminal insomnia. Collectively, the aforementioned symptoms had persisted for over 2 months prior this index visit. He also started having transient thoughts of suicide about a week prior to the current visit. Upon further evaluation, Patient Health Questionnaire-9 (PHQ-9) was administered, and the patient scored 21 which signifies severe depression. Based on patient's history and existence of clinical symptoms signifying panic disorder, a severity measure for panic disorder[26] was administered and a score of 0.6 was obtained. Based on the above presentation and evaluation, the diagnosis of major depressive disorder was reached based on DSM-V (The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition) diagnostic criteria and the patient was started on an antidepressant (Fluoxetine 20 mg) for 2 weeks after a psychiatrist consultation. He was maintained at 40 mg dosage for the following 6 weeks while attending to a clinical psychologist. At 3-month follow-up, there was a significant clinical improvement reported, PHQ-9 score was 10, and fluoxetine dose was reduced to 20 mg. Patient continued to attend psychotherapy sessions with objectives of strengthening coping skills, relaxation techniques and cognitive behavioural therapy. At 6-month follow-up, he had a PHQ-9 score of 1, had no features suggestive of panic disorder, his MSE was stable and his functional capacity had resumed. He was on alternate use of medication and scheduled for a psychotherapy visit once a month. Written informed consent was obtained from the patient for anonymized patient information to be published in this article.

*Case 2*: A 76-year-old female with a long-standing history of systemic hypertension and two previous strokes presented with a 7-week history of recurrent syncope ensuing from sinus arrest. She was scheduled for a dual chamber permanent pacemaker implantation. However, on the day of the procedure the patient became hesitant to go to the procedure room, that is, she was instantly doubtful, restless, had repeated shortness of breath, palpitations, body shaking, excessive sweating, tingling sensation on both upper and lower limbs and had an impending doom sensation. These symptoms lasted for about 10–15 min even after reassurance that the procedure was safe. The patient denied family or personal history of mental illness as well as previous history of substance use that is, alcohol or illicit drugs. Her vital signs were: BP 152/91 mmHg, PR 41 beats/min, Temperature 37.1°C, RR 18 breaths/min, and $SpO_2$ 100%. Implantation was rescheduled, however each time she was prepared for pacing, the same symptoms recurred for a somewhat similar duration. Three unsuccessful attempts transpired, and on the fourth attempt patient made it to the catheterization laboratory only to develop similar symptoms on the procedure table. Yet again, this resulted in postponement of the procedure and seeking a psychiatric consultation. Using the DSM-V diagnostic criteria and evaluation with the adult's severity measure of panic disorder (average total score of 3 signifying a severe panic disorder), the provisional diagnosis of panic disorder was reached. Patient commenced treatment with a low dose of anxiolytic (clonazepam 0.25 mg) at night. However, the dose frequency was increased to twice daily after 4 days and it was supplemented by psychoeducation and cognitive behaviour therapy from a clinical psychologist (on alternate days). Eventually she underwent successful implantation 6 days after initiation of the biopsychological treatment without exacerbation of panic symptoms. She was successfully discharged home through mental health clinic 25 days later. She never showed up at the mental health clinic and was lost to follow-up. Written informed consent was obtained from the patient for anonymized patient information to be published in this article.

*Case 3*: A 78-year-old female with a 38-year history of hypertension and a negative personal and family history of mental illness presented with dizziness and fainting spells for

7 weeks. On examination, her vital signs were: BP 132/79 mmHg, PR 21 beats/min, temperature 37.1°C, RR 14 breaths/min and $SpO_2$ 100%. Electrocardiogram revealed Mobitz type II AV block, and she underwent dual chamber pacemaker implantation successfully. She was discharged in a stable state 4 days post pacing. However, 2 weeks post implantation, patient started complaining of difficulty in initiating and maintaining sleep, feelings of worriedness and uneasiness coupled with occasional palpitations. At times, she reported to be tearful with low mood and having a sense of despair. She attributed these symptoms to her stressful thoughts of having a long-standing cardiac condition coupled with her recent implant. She became easily agitated, unable to do minimal house chores and adhered poorly to her antihypertensives and lifestyle modification, without clear reasons. Patient was hospitalized again for evaluation and a psychiatrist consultation was sought. Psychiatrist assessment established that the patient had somewhat similar symptoms 8 years ago while recovering from a motor traffic accident, however such symptoms disappeared without any intervention. Based on the clinical judgement supplemented with DSM-V diagnostic criteria, a provisional diagnosis of adjustment disorder with mixed anxiety and depressed mood was attained. Given the score of 7 on PHQ-9 (i.e. mild depression), a clinical psychologist was consulted and individual psychotherapy was initiated. She was discharged in a fairly stable state and an assessment during subsequent follow-up revealed significant mental and clinical improvement. Written informed consent was obtained from the patient for anonymized patient information to be published in this article.

*Case 4*: A 74-year-old male with a history of diabetes, hypertension and two previous strokes presented with syncopal attacks and persistent dizziness. He denied family or personal history of mental illness. On examination, his vital signs were: BP 156/95 mmHg, PR 24 beats/min, temperature 36.8°C, RR 19 breaths/min and $SpO_2$ 99%. Electrocardiogram revealed a complete heart block, and he underwent a dual chamber permanent pacemaker implantation successfully. Six hours post implantation he became aggressive and verbally abusive coupled with second person auditory hallucinations. He was prescribed an antipsychotic (1.5 mg of haloperidol) once daily and the above symptoms resolved within 48 hours. However, while in the ward, his speech was still incoherent with beliefs of being harmed, he claimed 'nurses are putting poison in my drugs'. A psychiatrist was recalled and upon reassessment his antipsychotic dose tapered up to 1.5 mg twice daily for another 48 h. His psychotic symptoms resolved. He was discharged in a fairly stable state through the psychiatry clinic 10 days later. However, 5 days later, he was readmitted due to repeated anger outbursts, aggressiveness, visual hallucinations and disturbed sleep pattern. Antipsychotics (1.5 mg of haloperidol) every 12 h were reinstated, and such symptoms lasted within 48 h. A psychiatrist was consulted and a preliminary diagnosis of a brief psychotic disorder according to DSM-V diagnostic criteria was reached. A recommendation from a psychiatrist was to continue with haloperidol 1.5 mg twice a day while being psycho-evaluated by a clinical psychologist. There was no significant perpetuating stressor that was reported by the patient, and he was symptom free by the 10th day after re-initiating antipsychotics. He was discharged on the 11th day of hospitalization and during his pacemaker clinic visit (6 months later), he was quite stable and symptom free. There was no report of him attending the mental health clinic for follow-up. Written informed consent was obtained from the patient for anonymized patient information to be published in this article.

*Case 5*: An 81-year-old female, with a long-standing history of hypertension, type 2 diabetes mellitus and a negative personal/family history of mental illness was implanted a dual chamber pacemaker because of sick sinus syndrome with intermittent AV block 4 years ago. She presented with a 14-day history of fever, body pain, malaise and a loss of appetite. The fever was intermittent and common regional causes of febrile illness (i.e. malaria, typhoid and urinary tract infection) were ruled out. On examination, her vital signs were: BP 108/82 mmHg, PR 54 beats/min, temperature 39.8°C, RR 34 breaths/min and $SpO_2$ 99%. Transesophageal echocardiography revealed a large mobile mass (18 mm × 15 mm) attached to the ventricular pacemaker lead. Pacemaker revision and pocket exploration drained 190 cc of serosanguinous discharge from the pocket, and penicillin-resistant *S* epidermidis was isolated from cultures. She received peri-procedural prophylaxis with Vancomycin then the pacemaker system was removed following thoracotomy. After 2 weeks of antibiotic treatment a new transvenous dual chamber pacemaker was implanted via the right cephalic vein. However, 24 h after the procedure she started complaining of visual hallucinations, seeing 'white animals with halos' surrounding her bed and occasionally a young girl in red clothes threatening her. She would see these images seldom during the day but worse at night due to frequent awakening. She experienced sleeping difficulty, loss of memory, felt irritable and anxious and became unaware of her surroundings. Her speech and train of thought were incoherent and sometimes she would become unresponsive and just stare or shouts about irrelevant topics. A psychiatrist conducted an assessment 3 days after the onset of patient's confused state, and due to the clinical presentation and the prevailing risks (i.e. old age, hypertension, diabetes and recent pacing), a diagnosis of organic brain syndrome was attained. Upon initiation of antipsychotic drug (haloperidol 1.5 mg nocte) coupled with physical and environmental support, delirium symptoms started to resolve after a week. She was discharged in a stable state after 16 days of hospitalization. Patient never attended scheduled outpatient visit and phone call to the next of kin revealed that the patient died at home 3 weeks post discharge. Written informed consent was obtained from a legally authorized representative for anonymized patient information to be published in this article.

## Discussion

Attributable to significant developments in the diagnosis of arrhythmias, the last 2 decades have witnessed a rapidly increased burden making it one of the leading epidemics with global public health ramifications.[27] Moreover, notwithstanding the associated morbimortality, many of the resource-limited settings have deficiencies in delivery of comprehensive arrhythmia care.[7,28] Particularly in SSA region, about 50% of patients requiring pacemaker implantation succumb to premature sudden cardiac death due to unavailability of pacing services.[4,29]

Psychiatric assessment continues to be the exception rather than the standard of care in routine clinical practice. Preprocedural psychological evaluation is the standard practice before a patient undergoes surgery/intervention; however, psychiatric disorders are seldom addressed prior to such procedures. Incessant lifestyle adjustments made by patients with chronic illness to adapt to their clinical condition or management may result with profound psychological changes.[30] As a consequence, emotional disarray linked to interventional procedures may potentially aggravate previous psychiatric conditions or even precipitate new psychopathologies.[21–25] Furthermore, psychological disturbances are barriers to adherence (both pharmacotherapy and behaviour change), negatively impact quality of life and portend poor prognosis.[31,32]

Despite the well-known deleterious impact of mental health disorders on cardiac outcomes, psychological disturbances are relatively understudied yet of vital importance to the overall health of post-pacing patients. Moreover, notwithstanding the high burden of mental illnesses and the underdeveloped mental healthcare system in SSA, up to 70% of mental disorders go undetected by the healthcare providers.[33] The unsatisfactory reported rates of mental health literacy (i.e. ability to detect, diagnose and adequately treat) among healthcare professionals underscore the compelling need to improve their recognition.[34]

As it was evident in this case series, persons undergoing permanent cardiac pacing may experience various psychological alterations pre and post implantation. A high pre- or post-procedure psychological symptom burden is frequently indicative of a maladaptive response to surgical/interventional stress with increased likelihood of unfavorable physiological outcomes.[35–37] Moreover, as depicted in the five cases, comorbid mental illness was associated with more than anticipated length of hospital stay (including rehospitalizations) inevitably with increased healthcare utilization and cost of care. Likewise, given the prognostic implications of psychological disturbances and difficulties in forecasting which patients may result from them, it is prudent that healthcare professionals are aware of mental disorders so as to ensure their early recognition and timely intervention or referral.

## Conclusion

To conclude, this case series illustrates variable consequences of poor psychological adaptation to cardiac pacemakers, and it underscores the importance of continued psychological evaluation to such patients. In view of the growing frequency of pacing procedures and the acknowledged low mental health literacy amongst clinicians, routine mental status assessment is paramount in providing timely psychological intervention with resultant better clinical outcomes and improved HRQoL post implantation.

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### Author contributions

P.P., L.R.M. and S.V.B took the history and performed the physical examination; L.R.M. was responsible for the mental health evaluation and management; Z.S.M. and M.K. were involved in clinical cardiac management; H.A.M performed the ECHO; P.R.K. and S.V.B. were responsible for the pacemakers' implantation; P.P. wrote the initial draft of the article. All authors reviewed and contributed to the final version of this case report.

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### Ethics approval

Our institution does not require ethical approval for reporting individual cases or case series.

### Informed consent

Written informed consents were obtained from the patient(s) or a legally authorized representative(s) for anonymized patient information to be published in this article.

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