Fungating Basal Cell Carcinoma of a Pacemaker Pocket: A Case Study and Review of the Literature

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Abstract
Over 180,000 pacemakers are implanted annually in the United States. Tumors originating over pacemaker pockets have rarely been reported. We present the case of an 83 year old male with an invasive basal cell carcinoma involving a pacemaker pocket. A fungating tumor mass over the implant site had previously been managed as a chronic non-healing wound at a local wound center. Lack of clinical improvement led to a referral to our plastic surgery service where a Marjolin’s Ulcer was suspected. This in addition to concern for loss of the pacemaker pocket led to operative intervention. The mass was excised en bloc with the pacemaker pocket. The pacemaker was relocated into an ipsilateral subpectoral pocket after creation of a transmuscular channel for the defibrillator and pacemaker leads. Pathology of the lesion showed the presence of a basal cell carcinoma. To the best of our knowledge we are the first to report a basal cell carcinoma invading a pacemaker pocket. Furthermore, comorbidities of the presented patient necessitated the creation of a unique submuscular pocket for the pacemaker. With an increasing usage of pacemakers, it is important to understand the extent in which these generators and their installation affect the skin.

Introduction
Over 180,000 pacemakers are implanted annually in the United States.1 As the population of people with pacemakers grows, long term complications associated with insertion and wound healing begin to emerge. A rarely reported complication of pacemaker implantation is tumor growth originating in or involving the pacemaker pocket. The most common malignant neoplasms that involve the pacemaker pocket are of breast cancer origin.2 Development of a basal cell carcinoma superficial to a pacemaker has been previously documented in two cases.3,4 However, neither incidents were reported to invade the pacemaker pocket. To the best of our knowledge we are the first to report a basal cell carcinoma invading a pacemaker pocket.

The Case
An 83 year old man presents to clinic with a non-healing wound for the past year located superficial to his pacemaker. The patient had a significant past medical history of complete heart block with permanent pacer dependence, congestive heart failure, atrial fibrillation, diabetes mellitus type two and prior two vessel coronary artery bypass graft.

Figure 1. Fungating tumor lesion before and after surgical intervention.
Suspicion of a neoplastic process due to the chronic nature and severity of the wound prompted surgical intervention. Due to the patient’s previous cardiac history of severe myocardial scarring, conversion to new leads on the contralateral side was deemed to be high risk. Therefore every effort was made to salvage his original pacemaker leads while obtaining a clear resection of the large tumor.

A dual team approach with cardiology and plastic surgery was undertaken. A temporary pacer was placed through the left femoral vein. Intraoperative examination revealed neoplastic invasion tracking from the superficial lesion deep into the underlying pocket. A twelve centimeter en bloc resection of the tumor and pacemaker pocket was performed. Frozen section margins were clear and an invasive basal cell carcinoma was identified.

A pocket was developed in the avascular plane laterally between the pectoralis major and minor muscle approximately five centimeters in diameter. The limited size of the pocket was used to secure the generator within it. A transmuscular tunnel fabricated from imbricated muscle with 2-0 vicryl suture in figure of eight buried knot stitches, was created to secure the wire. The 4-5 cm tunnel followed the natural medial arch of the wire.

A large fasciocutaneous rotational flap was utilized to reconstruct the chest wall defect. Submuscular placement of the generator was chosen because of the elevated risk of exposure associated with direct flap coverage. Furthermore, the submuscular placement eliminated the risk of generator migration.

The patient was discharged on postoperative day one and has done well since.

Discussion

The pathophysiology leading to tumors invading a pacemaker pocket has not yet been elucidated. Pacemakers are contained within a titanium-plated case. Some authors hypothesize this artificial implant results in chronic irritation and thus inflammation of the surrounding tissue.5 This chronic inflammation leads to increased cell turnover, and may promote the transformation and growth of neoplastic cells.2 Others have hypothesized that the electromagnetic field generated by the device can cause neoplastic proliferation. However, this has been challenged by animal studies that have shown no evidence of cancer causation by electromagnetic field exposure.6 Still other authors attribute the relationship of cancer proliferation and location within the pacemaker pocket to disruption of lymphatic drainage. Abnormal lymph drainage due to surgical disruption results in malignant cell deposition in the area of the pocket.7 This is exemplified in the case of a malignant melanoma occurring at a pacemaker pocket.5 At this time no consensus of the pathophysiology has been reached.

The management of neoplasms occurring over pacemakers must be decided upon on an individual basis. Most authors explanted the pacemaker, created a new pocket on the contralateral side, and re-implanted the device. This procedure allows for appropriate surgical removal of the tumor without fear of damage to the pacemaker.2,7 In the case discussed, due to a previous cardiac history with severe myocardial scarring, removal of the wire leads was deemed too high risk. Instead, implantation of a new pacemaker into a subpectoral pocket using a transmuscular tunnel for the defibrillator and
Case Report

Transition of a pacemaker to a subpectoral neopocket is an effective ipsilateral solution in high risk patients as it provides excellent generator coverage, appearance, and surgical simplicity.

References