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Annular Erythema Caused by Impending Pacemaker Extrusion

RAINER GERDSEN, HANS WILHELM KAISER, KAI FRIEDRICH, EBERHARD RABE and THOMAS BIEBER

Department of Dermatology, University of Bonn, Germany

A 72-year-old patient with an implanted cardiac pacemaker presented with a circumscribed erythematous area on his chest. It was only several months later, after he had developed positional, localized pain in this area, that the diagnosis of an impending pacemaker extrusion became evident. This case illustrates the diagnostic difficulties in patients with pacemaker-associated skin lesions. Regular follow-up examinations and close co-operation of dermatologists, cardiologists and cardiothoracic surgeons are of major importance in view of the potentially life-threatening complications. ***Key words: pacemaker erythema; pacemaker infection; pacemaker dermatitis.***

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Rainer Gerdsen, Klinik und Poliklinik für Dermatologie, Sigmund-Freud-Strasse 25, D-53105 Bonn, Germany.

Dermatologists are rarely confronted with complications after implantation of cardiac pacemakers. When skin lesions develop around the pacemaker pocket it is important to rule out impending pacemaker extrusion and pacemaker infection, both of which require urgent surgical intervention. Allergic or irritant-toxic pacemaker dermatitis and reticular teleangiectatic pacemaker-erythema are 2 other conditions that may follow implantation of cardiac pacemakers.

CASE REPORT

A 72-year-old patient was referred by a cardiothoracic unit with an erythematous skin lesion on his left chest in November 1997. A cardiac pacemaker (CPI Delta TRS 938; DDD) had been implanted 4.5 years earlier to correct a third-degree heart block. The electrodes were inserted through the left subclavian vein. In March 1995 a coronary artery vein bypass graft had been performed. In May 1997 the patient developed an asymptomatic, slowly enlarging skin lesion in the left precordial area. Previous treatment with a topical steroid preparation over a period of 2 weeks had not been helpful. Initial examination revealed a circumscribed reticular erythema, 4.5×6 cm in size, located directly below the palpable pacemaker generator (Fig. 1). There was no tenderness and no hyperthermia. Duplex sonography showed no obstruction of his left subclavian vein. Histological examination revealed a superficial perivascular infiltrate of lymphocytes and histiocytes with some eosinophils. Erythrocyte sedimentation rate, C-reactive protein and peripheral blood count results were within normal limits. Allergy patch testing of original pacemaker material, provided by the manufacturer, was negative. Examination by a cardiologist demonstrated normal pacemaker function. X-ray examination of the chest showed a 2-chamber pacemaker with a correctly positioned electrode.

Follow-up examination in February 1998 revealed that the erythema had become less intense centrally but extended peripherally. In March 1998, after the patient reported local positional pain and developed an accentuation of the apical segment of the pre-existing erythema, he was referred to a cardiothoracic unit. The clinical diagnosis of impending pacemaker extrusion was established, and confirmed intra-operatively. Once bacterial infection was considered unlikely, the old generator was removed, and a replacement inserted into a new submuscular pocket on the left chest.

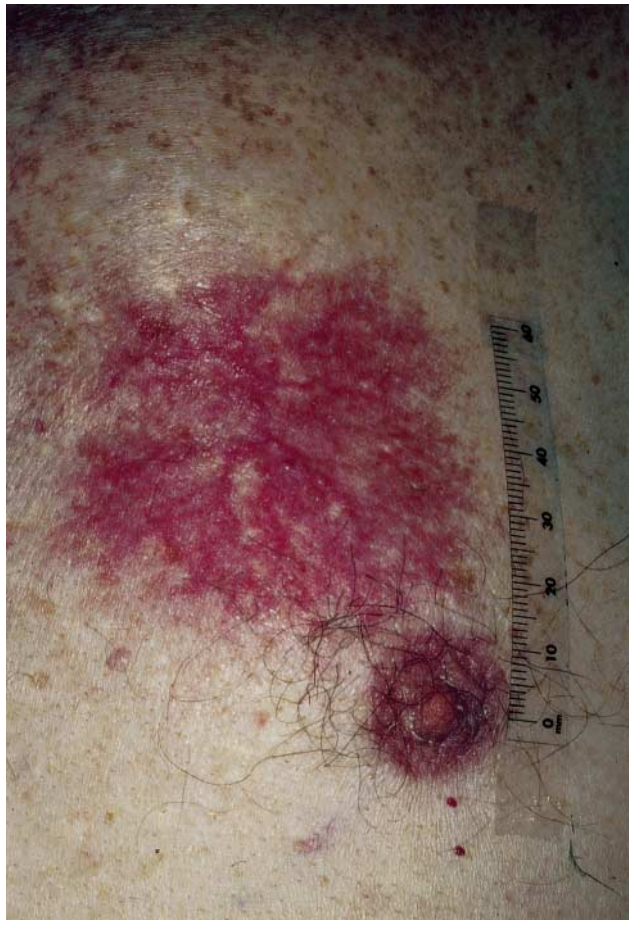

Fig. 1. Impending pacemaker extrusion; circumscribed reticular erythema below the palpable pacemaker pocket.

By April 1998, only minor erythema, a little scaling and some hyperpigmentation remained in the apical segment of the previously affected area.

DISCUSSION

Reports of complications after implantation of cardiac pacemakers mention thrombotic and embolic problems, lead fracture and dislocation, electrical failure of the generator, bacterial infections of the lead or the pacemaker pocket and perforation of material into a heart ventricle or through the skin (1–8).

When a patient develops skin lesions in the area of the pacemaker pocket, the differential diagnosis includes the following conditions: impending pacemaker extrusion, pacemaker infection, pacemaker dermatitis and reticular teleangiectatic pacemaker erythema.

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Impending pacemaker extrusion

Small and superficial generator pockets and frequent pectoral muscle movements are risk factors for rotation and displacement of the generator (3). This can result in mechanical pressure on the overlying tissue, especially in elderly patients whose subcutaneous tissues are lax (3). Circumscribed erythema develops on the overlying skin. This is accompanied by local pain, occasionally severe, which is aggravated by deep breathing or pectoral muscle movement (3, 7). Surgical intervention is needed to prevent pressure necrosis and extrusion of the generator through the skin (3, 7, 8).

Pacemaker infection

A pacemaker infection may develop early after the operation or up to several years after pacemaker implantation, either as a result of pressure necrosis or without an obvious source (1, 2, 4, 8–12). Accompanied by general signs of infection (fever, leukocytosis, increased erythrocyte sedimentation rate and C-reactive protein) a tender erythematous swelling develops in the area of the pacemaker pocket (1, 2, 4, 8–12). Apparative investigations, such as conventional radiography, computer tomography and trans-oesophageal echocardiography, may be helpful in establishing the diagnosis when clinical symptoms are minimal (13–15). Even when the infection develops several years after pacemaker implantation, urgent surgical intervention is required to prevent septicaemia or endocarditis (1, 4, 6, 10, 15, 16).

Pacemaker dermatitis

The term pacemaker dermatitis was introduced by Brun & Hunziker in 1980 (17). It refers to localized or generalized inflammatory and eczematous skin lesions that develop following implantation of cardiac pacemakers (17–24). The condition is rare, and is marked by aetiological and morphological variability. Contact allergic or irritant-toxic reactions are regarded as causative mechanisms for the development of the skin lesions. Titanium, as a major component of the generator case has been accused as the causative allergen in some cases (17, 18, 20, 23). In the 2 reports with positive patch test reactions to titanium, however, skin lesions continued to develop after substitution with a parylene-, respectively silicone-coated case (17, 18). Romaguera & Grimalt described a generalized dermatitis after implantation of an epoxyresin-coated pacemaker (22). In this case, a positive allergy patch test indicated a reaction to incompletely hardened epoxy resin cement. An irritant-toxic reaction to unhardened silicone adhesive was regarded as the causative factor in a case of nummular eczematous dermatitis described by Raque & Goldschmidt (21).

Reticular teleangiectatic pacemaker erythema

Another rare, but morphologically defined, entity is reticular teleangiectatic pacemaker erythema. Circumscribed erythema develops around the pacemaker pocket several weeks to 3 years after pacemaker implantation, or after substitution of the generator. It is characterized by teleangiectatic blood vessels in a reticular distribution (25–29). Histological examination reveals ectatic capillary vessels and a perivascular infiltrate of histiocytes and lymphocytes (25–28). Similar skin lesions have been described after implantation of automatic cardioverter defibrillators (13, 27, 30). Regular follow-up examinations over a period of several years showed that the skin lesions remain more or less unchanged (13, 27). Postoperative change of local blood circulation and volume-induced pressure by the generator, with resulting passive hyperaemia and change in the local architecture of supplying blood vessels are regarded as causative mechanisms (13, 25–29). Electromagnetic phenomenon and a generator-induced increase in local tissue temperature have also been proposed as possible causes (27, 30). Scientific proof, however, has not yet been delivered for either of these theories.

CONCLUSIONS

Our case report illustrates the diagnostic difficulties arising in patients presenting with skin lesions after pacemaker implantation. Our patient initially showed painless circumscribed erythema. In the absence of further signs of inflammation or infection, a diagnosis of impending pacemaker extrusion or bacterial pacemaker infection seemed unlikely. Allergy patch testing of original material, provided by the manufacturer was negative. These findings were consistent with the diagnosis of reticular teleangiectatic pacemaker erythema. Only after the erythematous area had enlarged and positional pain had developed over the generator side, did the clinical diagnosis of impending pacemaker extrusion infection become apparent. This required urgent surgical intervention.

This case highlights the need for regular clinical examinations of patients with pacemaker-associated skin lesions. A life threatening pacemaker infection is not excluded by the absence of other symptoms or by normal laboratory tests. The close co-operation of dermatologists, cardiologists and cardiothoracic surgeons is of major importance.

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