

Arteriovenous Fistula after Cardiac Catheterization from a Radial Approach

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The radial approach is gaining popularity in interventional cardiology in Israel and worldwide mainly due to the dramatic reduction in vascular complications compared to the more traditional femoral approach. However, physicians mastering this technique should be aware that the radial approach, although very safe, is not completely free of complications.

We report a rare case of radial arteriovenous fistula complicating percutaneous coronary intervention for acute myocardial infarction. The fistula was diagnosed clinically and confirmed with Doppler ultrasound. It was successfully treated with surgical ligation.

PATIENT DESCRIPTION

A 55 year old woman was admitted with acute anterior ST-elevation myocardial infarction. Treatment with aspirin, clopidogrel, heparin and eptifibatide was initiated and an emergent cardiac catheterization was performed from the right radial approach using a Terumo 6-Fr 10 cm hydrophilic sheath. She had severely reduced left ventricular function and thrombotic occlusion of proximal left anterior descending artery. Primary angioplasty with thrombus aspiration and implantation of a Yukon Choice 3/32 mm (Translumina GmbH, Germany) bare metal stent was successfully performed. The eptifibatide infusion was continued for the next 24 hours. The patient's further hospital course was uneventful and she was discharged home in stable condition with a treatment regimen of aspirin, clopidogrel, bisoprolol and atorvastatin.

Two months later the patient presented with dilated veins of her right wrist and hand [Figure A]. There was a palpable

thrill and a continuous murmur was heard over the radial puncture site. The Doppler ultrasound demonstrated a radial arteriovenous fistula [Figure B]. Although there was no hand ischemia, the patient was concerned about the cosmetic defect. She was therefore referred for surgical repair of the fistula, which was performed on completion of the clopidogrel treatment. During the operation the right radial artery and cephalic vein were carefully dissected with proximal and distal control, and the fistulous tract was ligated. Doppler ultrasound after the operation confirmed the successful closure of the fistula with preservation of the antegrade flow in the radial artery [Figure C].

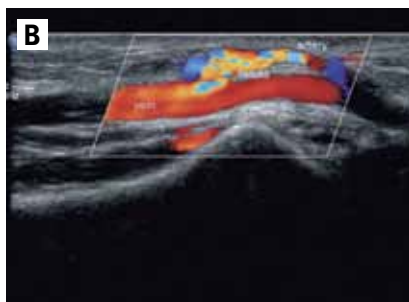
COMMENT

Arteriovenous fistula is a well-known complication of cardiac catheterization using the femoral approach with an overall incidence of approximately 1% in the modern era [1]. The clinical course is usually benign; however, serious compli-

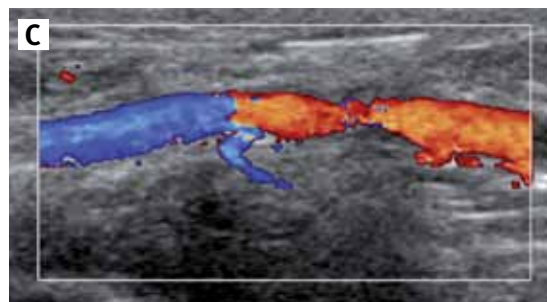
[A] Dilated veins on the right wrist and hand



[B] Doppler ultrasound demonstrating continuous turbulent flow between radial artery and vein



[C] Doppler ultrasound after the surgical ligation demonstrating absence of the flow through the fistulous tract and preservation of antegrade flow in the radial artery



cations such as limb ischemia and high output heart failure due to significant shunting can occur. Conversely, arteriovenous fistula complicating radial access for cardiac catheterization is exceedingly rare and is unlikely to cause any serious consequences. In fact, only one report of this complication was previously published in the English-language medical literature

[2]. As in our case, due to the superficial course of the radial artery, arteriovenous fistula in this location can be easily diagnosed and treated.

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References

1. Perings SM, Kelm M, Jax T, Strauer BE. A prospective study on incidence and risk factors of arteriovenous fistulae following transfemoral cardiac catheterization. *Int J Cardiol* 2003; 88: 223-8.
2. Pulikal GA, Cox ID, Talwar S. Images in cardiovascular medicine. Radial arteriovenous fistula after cardiac catheterization. *Circulation* 2005; 111: e99.

Capsule

Epidermal growth factor regulates hematopoietic regeneration after radiation injury

The mechanisms that regulate hematopoietic stem cell (HSC) regeneration after myelosuppressive injury are not well understood. Doan et al. identified epidermal growth factor (EGF) to be highly enriched in the bone marrow serum of mice bearing deletion of *Bak* and *Bax* in TIE2-expressing cells in *Tie2Cre; Bak1^{-/-}; Baxflox^{-/-}* mice. These mice showed radioprotection of the HSC pool and 100% survival after a lethal dose of total-body irradiation (TBI). Bone marrow HSCs from wild-type mice expressed functional EGF receptor (EGFR), and systemic administration of EGF promoted the recovery of the HSC pool in vivo and improved the survival of mice

after TBI. Conversely, administration of erlotinib, an EGFR antagonist, decreased both HSC regeneration and the survival of mice after TBI. Mice with EGFR deficiency in VAV-expressing hematopoietic cells also had delayed recovery of bone marrow stem and progenitor cells after TBI. Mechanistically, EGF reduced radiation-induced apoptosis of HSCs and mediated this effect through repression of the proapoptotic protein PUMA. These findings show that EGFR signaling regulates HSC regeneration after myelosuppressive injury.

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Eitan Israeli

Capsule

Interaction with activated monocytes enhances cytokine expression and suppressive activity of human CD4⁺CD45ro⁺CD25⁺CD127(low) regulatory T cells

Despite the high frequency of CD4⁺ T cells with a regulatory phenotype (CD25⁺CD127(low) FoxP3⁺) in the joints of patients with rheumatoid arthritis (RA), inflammation persists. One possible explanation is that human Treg cells are converted into pro-inflammatory interleukin-17 (IL-17)-producing cells by inflammatory mediators and thereby lose their suppressive function. Walter et al. set out to investigate whether activated monocytes, which are potent producers of inflammatory cytokines and are abundantly present in the rheumatic joint, induce pro-inflammatory cytokine expression in human Treg cells and impair their regulatory function. The presence and phenotype of CD4⁺CD45RO⁺CD25⁺CD127(low) T cells (memory Treg cells) and CD14⁺ monocytes in the peripheral blood (PB) and synovial fluid (SF) of patients with RA were investigated by flow cytometry. Memory Treg cells obtained from healthy control subjects underwent fluorescence-activated cell sorting and were then co-cultured with autologous activated monocytes and stimulated with anti-CD3 monoclonal antibodies. Intracellular cytokine expression,

phenotype, and function of cells were determined by flow cytometry, enzyme-linked immunosorbent assay, and proliferation assays. In patients with RA, the frequencies of CD4⁺CD45RO⁺CD25⁺CD127(low) Treg cells and activated CD14⁺ monocytes were higher in SF compared with PB. In vitro-activated monocytes induced an increase in the percentage of IL-17-positive, interferon-gamma (IFN γ)-positive, and tumor necrosis factor-alpha (TNF α)-positive Treg cells as well as IL-10-positive Treg cells. The observed increase in IL-17-positive and IFN γ -positive Treg cells was driven by monocyte-derived interleukin (IL)-1 β , IL-6, and TNF α and was mediated by both CD14⁺CD16⁻ and CD14⁺CD16⁺ monocyte subsets. Despite enhanced cytokine expression, cells maintained their CD25⁺FoxP3⁺CD39⁺ Treg cell phenotype and showed an enhanced capacity to suppress T cell proliferation and IL-17 production. Treg cells exposed to a pro-inflammatory environment showed increased cytokine expression as well as enhanced suppressive activity.

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