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journal or publication title	Therapeutic Apheresis and Dialysis
volume	19
number	6
page range	624-626
year	2015-12-01
URL	http://hdl.handle.net/2297/43949

doi: 10.1111/1744-9987.12324

Efficacy of Low-Density Lipoprotein Apheresis in Salvaging Critical Limb Ischemia Induced by Acute Thrombotic Occlusion on Peripheral Artery Disease

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Short title LDL apheresis in Acute Thrombotic Occlusion

Total word count 499 words

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We report a 74-year-old male with a previous history of coronary stenting and left femoro-popliteal (F-P) bypass surgery. He took rosuvastatin, ARB, and spironolactone other than antiplatelet (aspirin and clopidgrel) and warfarin. He admitted to our hospital one day after cholecystectomy because of sudden pain of the left lower extremity during the discontinuation of double antiplatelet and anticoagulant therapy. Enhanced computed tomography (CT) revealed total occlusion of the proximal portion of the F-P bypass anastomotic site on the common femoral artery and on the popliteal artery to the anterior tibial artery (Fig. 1A). Even after heparin infusion and re-introduce of antiplatelet (aspirin and cilostazol), his symptom did not improve. Urgent percutaneous angioplasty failed to recanalize the region because of recurring thrombus associated with elevated creatine kinase (2792 IU/L). His left ankle blood pressure was undetectable, and thermography revealed coldness of his left lower limbs (Fig. 1A). Consequently, LDL apheresis (LDL-A) using a dextran sulphate cellulose column (Liposorber LA-15, Kaneka Corp. Osaka, Japan) was introduced through his antecubital veins while adequately controlling his LDL cholesterol to <60 mg/dl. We treated 3500ml of plasma per session. Heparin was given as an intravenous bolus (1000 IU) at the beginning and then continuously (500 IU/h) injections.

Surprisingly, the pain diminished, paresthesia improved and he felt warmth in his extremity only after the first session of LDL-A. The initial levels of total cholesterol, triglyceride, HDL cholesterol, and LDL cholesterol were 142, 85, 67 and 58 mg/dl, respectively, which were decreased to 89, 28, 61 and 17 mg/dl after LDL-A respectively.

After once a week 10 sessions of LDL-A, the serum fibrinogen level decreased from 390 to 335 mg/dl and D-dimer also decreased from 3.1 to 0.7 μg/ml. Thermography revealed an improvement of skin temperature (Fig. 1B). Moreover, enhanced CT showed the recanalization of proximal and distal portions of the F-P bypass anastomotic site (Fig. 1B), suggesting the thrombolytic effect of LDL-A. As a result, the ankle blood index improved to 0.69 and the patient could walk without pain after LDL-A.

LDL-A has been shown to improve clinical symptoms in patients with chronic peripheral artery disease (PAD)(1). The present case suffered acute thrombotic occlusion of his left leg accompanied by chronic PAD. After LDL-A, the thrombi completely disappeared with improvement in his symptoms. According to past reports(2), plasma constituents, including the proteins related to activation of the intrinsic coagulation pathway and some of the coagulation factors, are also absorbed by the dextran sulfate cellulose column. Another report indicated that not only cholesterol but also fibrinogen concentration,

which are correlated with plasma viscosity(3), was reduced during LDL-A(4). The combination of various factors, inactivation of the coagulation pathway, the improvement of hemorheology and enhanced collateral circulation might have also contributed to our patient's favorable outcome.

In conclusion, we report a case in which critical limb ischemia induced by acute thrombotic occlusion accompanied by chronic PAD was effectively salvaged by LDL-A. LDL-A could be a beneficial option to treat not only chronic PAD but also acute thrombotic occlusion.

Acknowledgements: None

Funding Sources: None

Disclosures: None

Figure legend

Figure 1.

Enhanced computed tomography (CT) and angiography showed thrombotic occlusion of the common femoral artery (CFA; arrow head) and the popliteal artery (POP; arrow). Thermography revealed coldness of his left leg. His left ankle blood pressure could not be detected before LDL-A (A). Enhanced CT showed recanalization of CFA and POP (outlined arrow head and outlined arrow, respectively). Thermography revealed almost normal skin temperature in his left foot, and ABI was recovered to 0.69 after 10 sessions of LDL-A (B).

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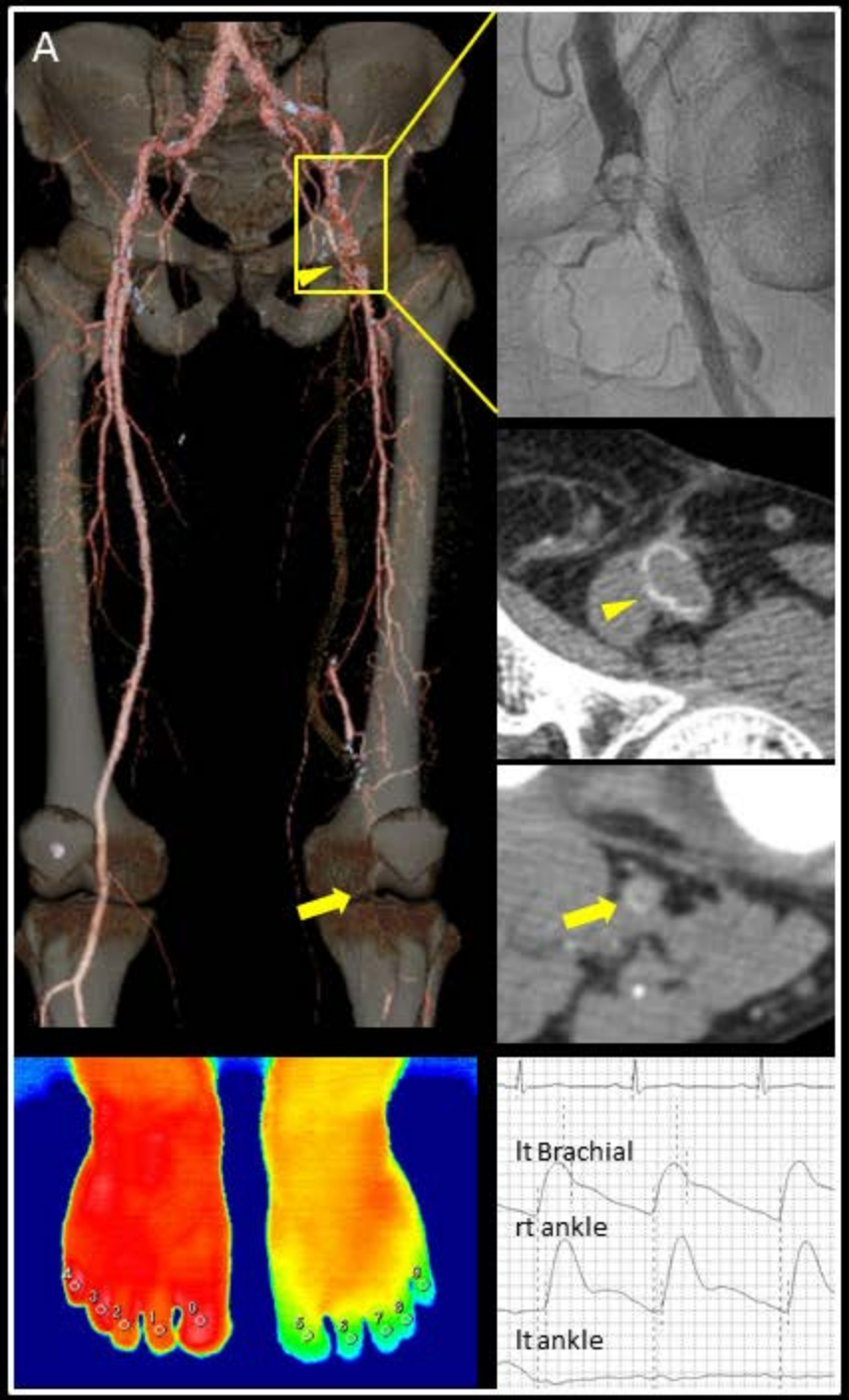
Fig 1.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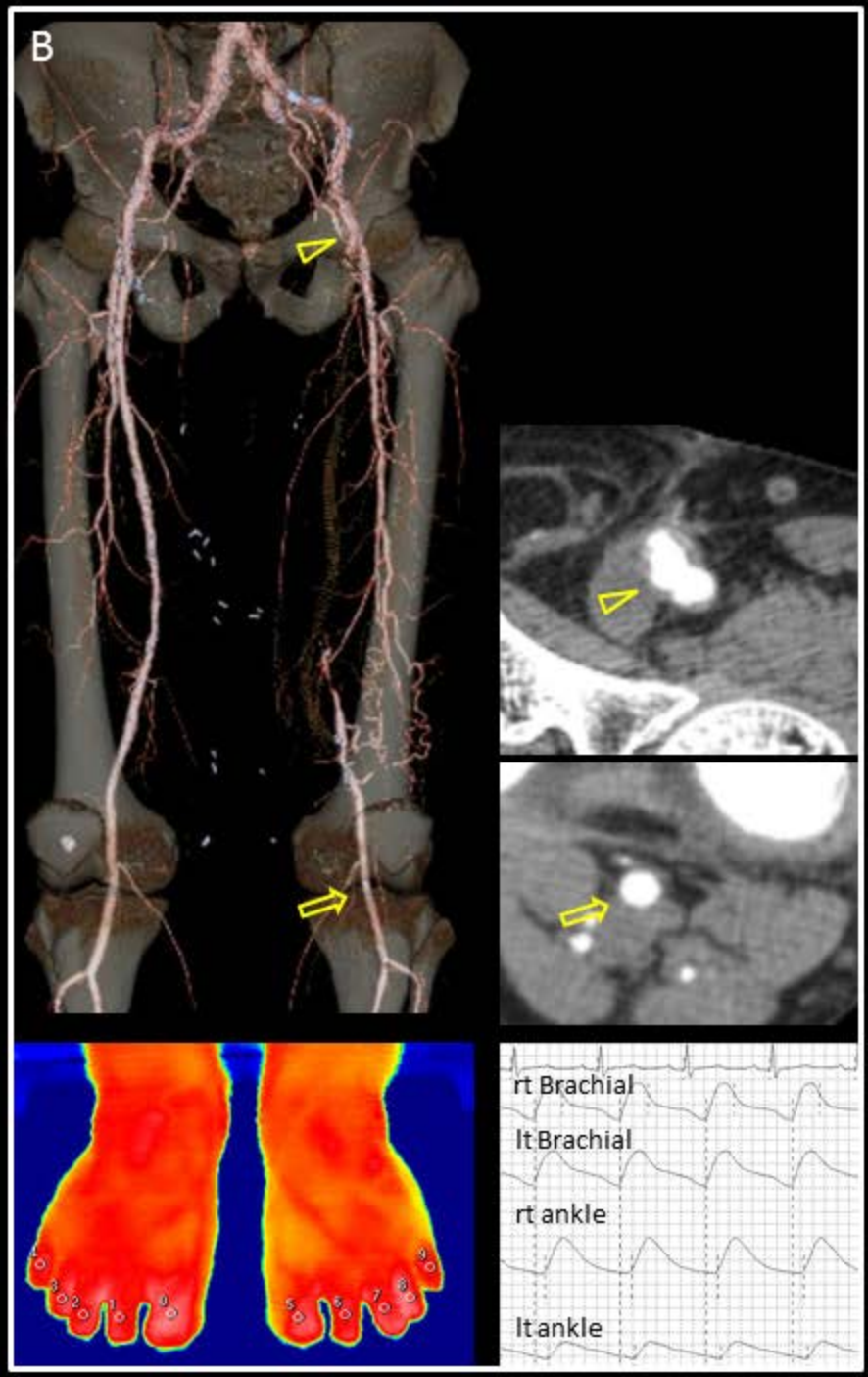
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