

The role of intraoperative 2D foot perfusion during percutaneous infrainguinal angioplasty in patients with critical limb ischemia

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Background. Critical limb ischemia (CLI) is an end stage of peripheral arterial disease. Percutaneous transluminal angioplasty (PTA) has gained a mainstream position in treatment of CLI. Frequently, multilevel hemodynamically significant atherosclerotic lesions are detected during PTA in patients with CLI. Therefore, intraoperative decision of intervention level and amount has to be undertaken based on macrovascular images acquired during intraoperative digital subtraction angiography (DSA) analysed by eye. Intraoperative 2D foot perfusion angiography (2DFPA) is a novel post-processing tool integrated in newest generation DSA equipment. It offers an objective quantitative analysis of different flow and contrast density parameters within region of interest (ROI). Consequently, it might become an additional objective intraoperative tool in estimation of operation volume.

Aim. To establish basic protocol for 2DFPA in Riga East University Hospital and perform pilot evaluation of the parameters acquired during 2DFPA.

Methods. In this case, the control study performed during June to November of 2020, and included 7 patients with CLI and intraoperative 2DFPA. 2DFPA performed through antegrade 6F 23 cm sheath in superficial femoral artery with automated injection volume/rate 15 ml/6 ml/s and fixed position of the foot during procedure. Following pre-intervention and post-intervention perfusion parameters analysed in whole foot ROI: arrival time (AT), time-to-peak (TTP), area under the curve (AuC), peak density (PD);

Results. The mean age – 71.5 (54–85) years, 4 males, 3 females. CLI Rutherford class V in all patients. One patient excluded due to foot movements during procedure and noncomparable 2DFPA results. 3 patients underwent PTA of superficial femoral artery, 3 patients – infrageniculate PTA. In 4 PTA procedures defined by operator as successful based on DSA, the following 2DFPA parameters were acquired: decrease of AT and TTP, and increase of PD and AuC was found corresponding with good technical result. 2DFPA showed no improvement of parameters in one PTA defined by operator as successful and in one PTA defined by operator as not successful.

Conclusion. 2DFPA is an easy and safe intraoperative analysis tool to be applied, although adaptation of protocol and patient positioning is required. Acquisition of intraoperative perfusion parameters pre- and post-treatment might serve as a marker for operation volume, if the desired perfusion goals are not achieved. Following larger scale trials have to be conducted to establish specific perfusion value ranges as treatment end-points.