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

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Summary

Background

Intraoperative 2D foot perfusion angiography (2DFPA) is a novel post-processing tool integrated in newest generation Interventional Radiology equipment.

It offers an objective quantitative analysis of different flow and contrast density parameters within region of interest (ROI). This method in future may play a significant role in estimation of percutaneous transluminal angioplasty operation volume in patients with critical limb ischemia.

Aim

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

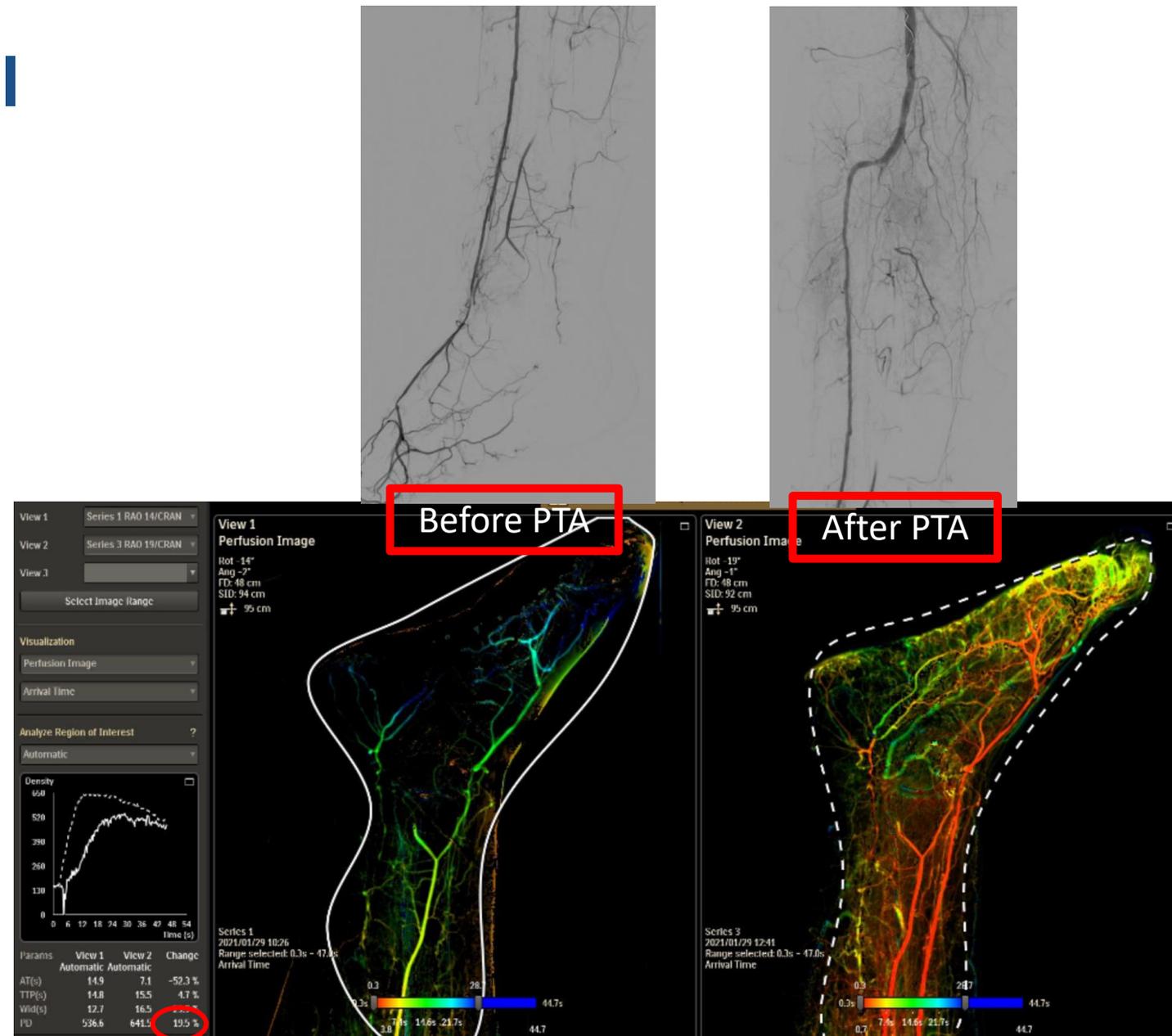
Methods

- Pilot case control study performed June to November 2020;
- From 11 selected patients with CLI and intraoperative 2DFPA evaluated only 7 patients met quality inclusion criteria.
- 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: defined protocol

- ❖ The mean age – 71.5 (range 54–85) years; 4 males, 3 females;
- ❖ CLI Rutherford class V in all patients;
- ❖ Several procedure protocols evaluated in practice.
- ❖ The following technical procedure details were found to produce the most reproducible and most easily acquired result:

- antegrade puncture of common femoral artery;
- 6F 23 cm sheath;
- Injection volume/speed rate 15ml/6ml/s;
- Fixation of foot by bandage;
- Automatized movement reduction function applied;
- Changes of injection sheath or X-ray arch position avoided;



Results

Parameter	Increase/d ecrease
AT	↓
TTP	↓
PD	↑
AuC	↑

Criteria for technically sufficient PTA operation

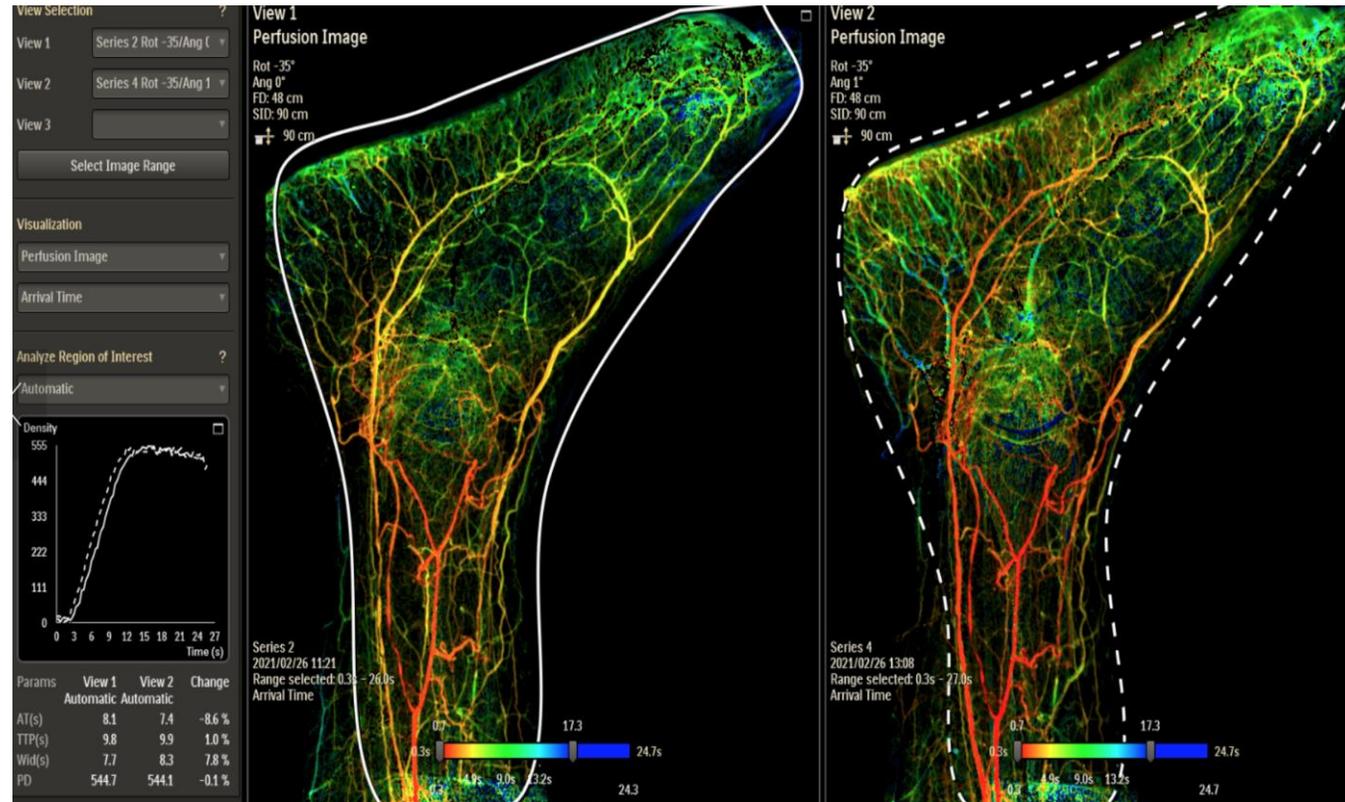


Fig. 1 On regular DSA visual assessment result evaluated as sufficient, but 2DFPA shows insufficient result

Results and conclusion

	Regular DSA		2DFPA		Mis-match
	Sufficient	Non-sufficient	Sufficient	Non-sufficient	
Patient 1	+		+		
Patient 2	+		+		
Patient 3	+		+		
Patient 4	+		+		
Patient 5		+		+	
Patient 6	+			+	+
Patient 7		+		+	



Fig.2 ROI on heel shows improvement of parameters after PTA

Conclusion:

- 2DFPA is an easy and safe intraoperative analysis tool to be applied;
- Intraoperative perfusion parameters pre- and post-treatment might serve as a marker for operation volume, if the desired perfusion goals are not achieved.
- Larger trials have to be conducted to establish specific perfusion value ranges as treatment endpoints;