

# ARTERIOVENOUS FISTULA SURVEILLANCE IN HEMODIALYZED PATIENTS: HOW, WHERE AND WHEN?

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## BACKGROUND

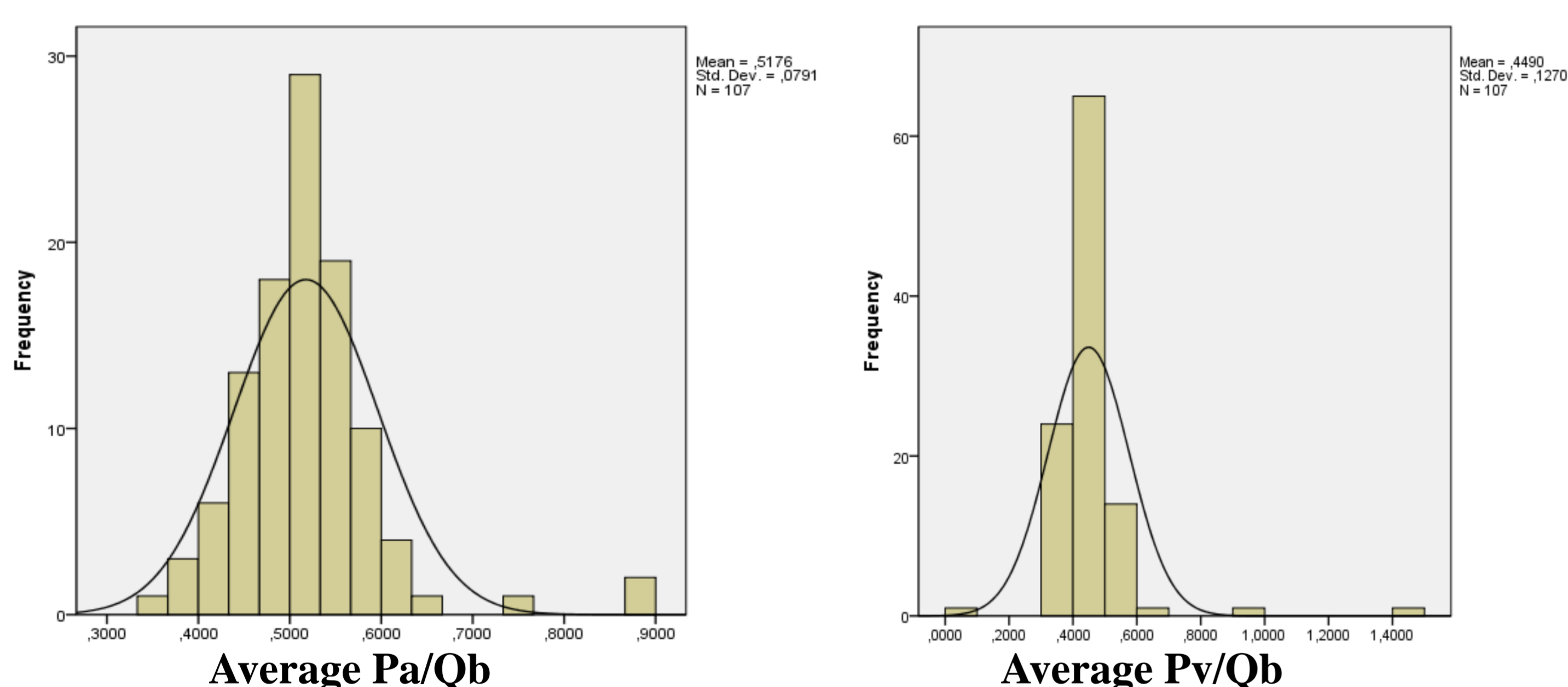
The arteriovenous fistula (AVF) is the optimal vascular access for hemodialysis patients and is considered as their "lifeline". Actual guidelines do not suggest a specific test or procedure to monitor vascular access patency, so every dialysis center relies on the experience and the competencies of the local nephrologists as well as the availability of other specialists at the site. Aim of our study was to evaluate different surveillance techniques and determine whether these could be applicable to all the patients and introduced in the clinical practice without the need of additional costs.

## METHODS

We considered eligible every patient dialyzing in our center with an AVF of native vessels. 107 patients were enrolled and followed from December 2014 to July 2015. Dialysis blood flow (Qb) and arterial (Pa) and venous (Pv) pressures were recorded at each dialytic session. A subgroup of 48 patients was randomly selected to undergo monthly Qb stress test (QBST) and 20 of these were further randomly selected to undergo a Doppler scan to calculate the brachial artery blood flow every three months. After a positive QBST, the patient performed a Doppler scan to evaluate the presence of stenosis. Second level examinations (i.e. fistulography) were performed in case of evidence of stenosis or reduced brachial artery blood flow at the Doppler scan.

## RESULTS

PATIENT CHARACTERISTICS	
Number	107
Sex M/F (%)	78 (73)/29 (27)
Age (years)	68.6 ± 14.1
Dialytic age (months)	74.2 ± 59.4
Arteriovenous fistula type (radio-cephalic/brachio-cephalic)	63 (58.9)/44 (41.1)
Survival of the actual AVF (months)	74.0 ± 57,3
Number of patients who underwent more than one fistula placing (2/3)	24/3



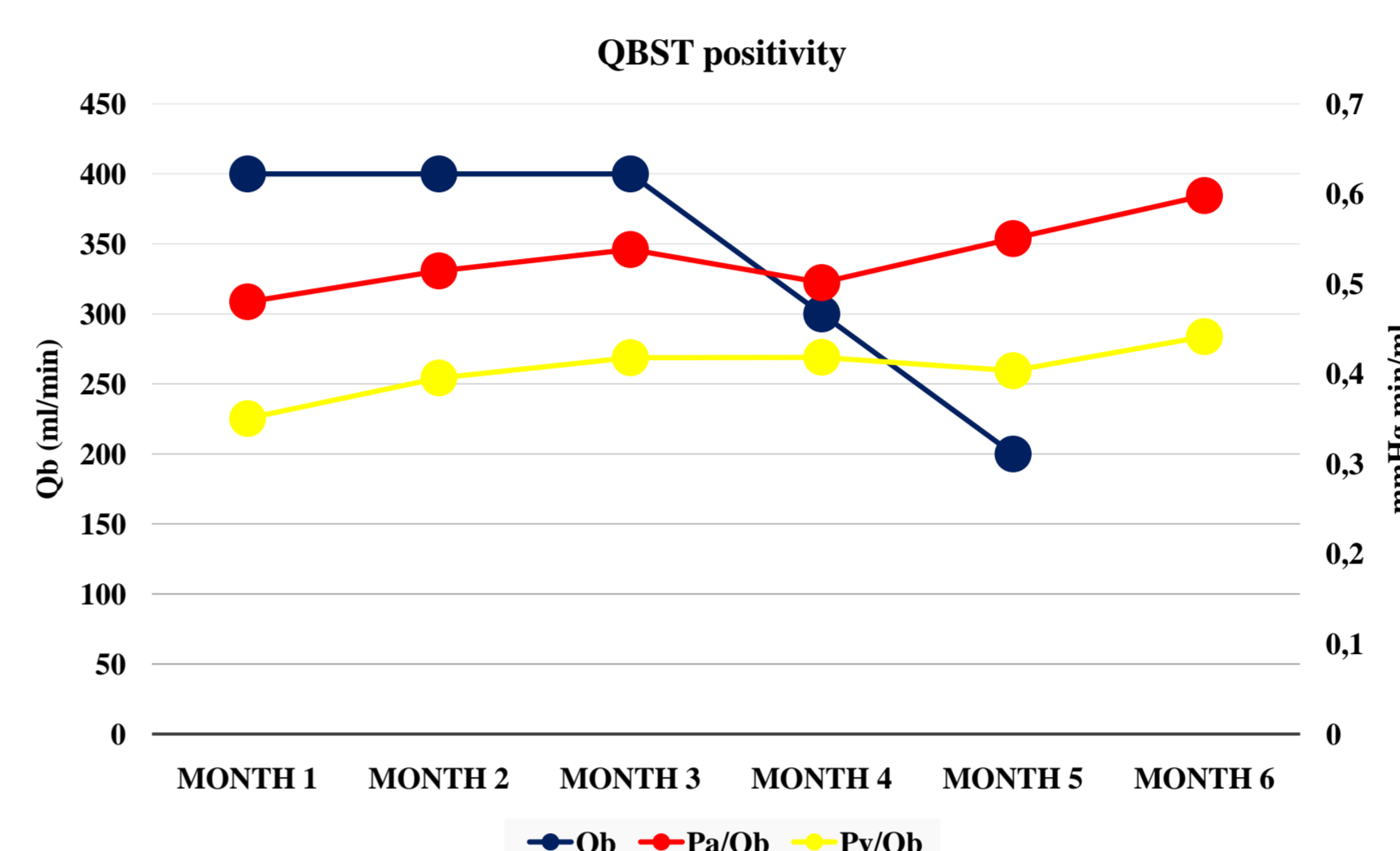
	1° Quartile	2° Quartile	3° Quartile	4° Quartile
Average Pa/Qb	da 0,3551 a 0,4750	da 0,4751 a 0,5135	da 0,5136 a 0,5464	da 0,5465 a 0,8938
Media Pv/Qb	da 0,3073 a 0,4041	da 0,4042 a 0,4330	da 0,4331 a 0,4806	da 0,4806 a 1,4112

**Figure 1.** Normalizing Pa and Pv for Qb, we observed a Gaussian distribution of the values and divided our population in quartiles.

Arterial pressure	N. positive	N. positive at Qb = 400 ml/min
1° Quartile (n=26)	3 pts (8 pos)	3 pts (5 pos)
2° Quartile (n=27)	6 pts (10 pos)	3 pts (4 pos)
3° Quartile (n=27)	7 pts (13 pos)	4 pts (6 pos)
4° Quartile (n=27)	7 pts (22 pos)	7 pts (19 pos)

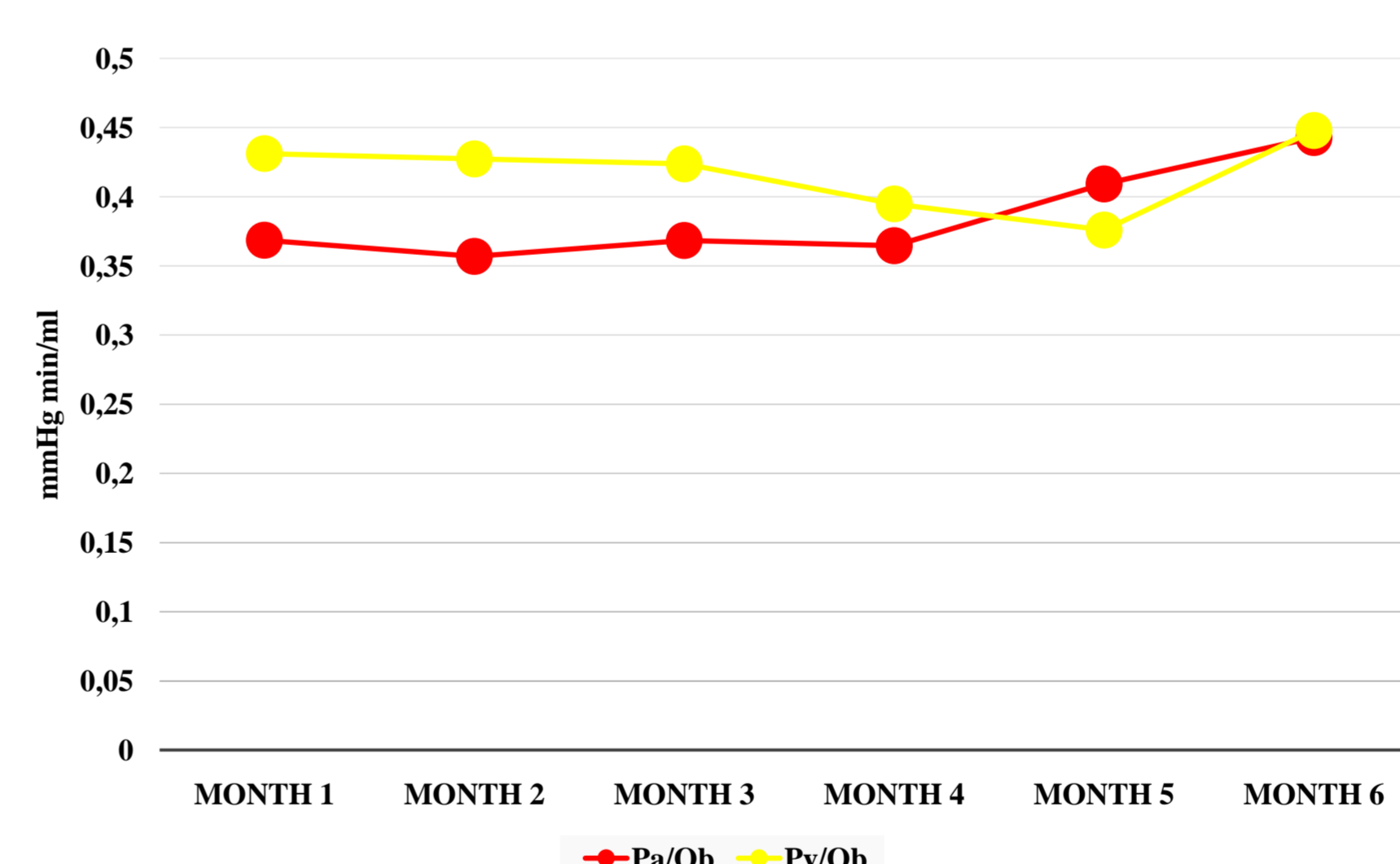
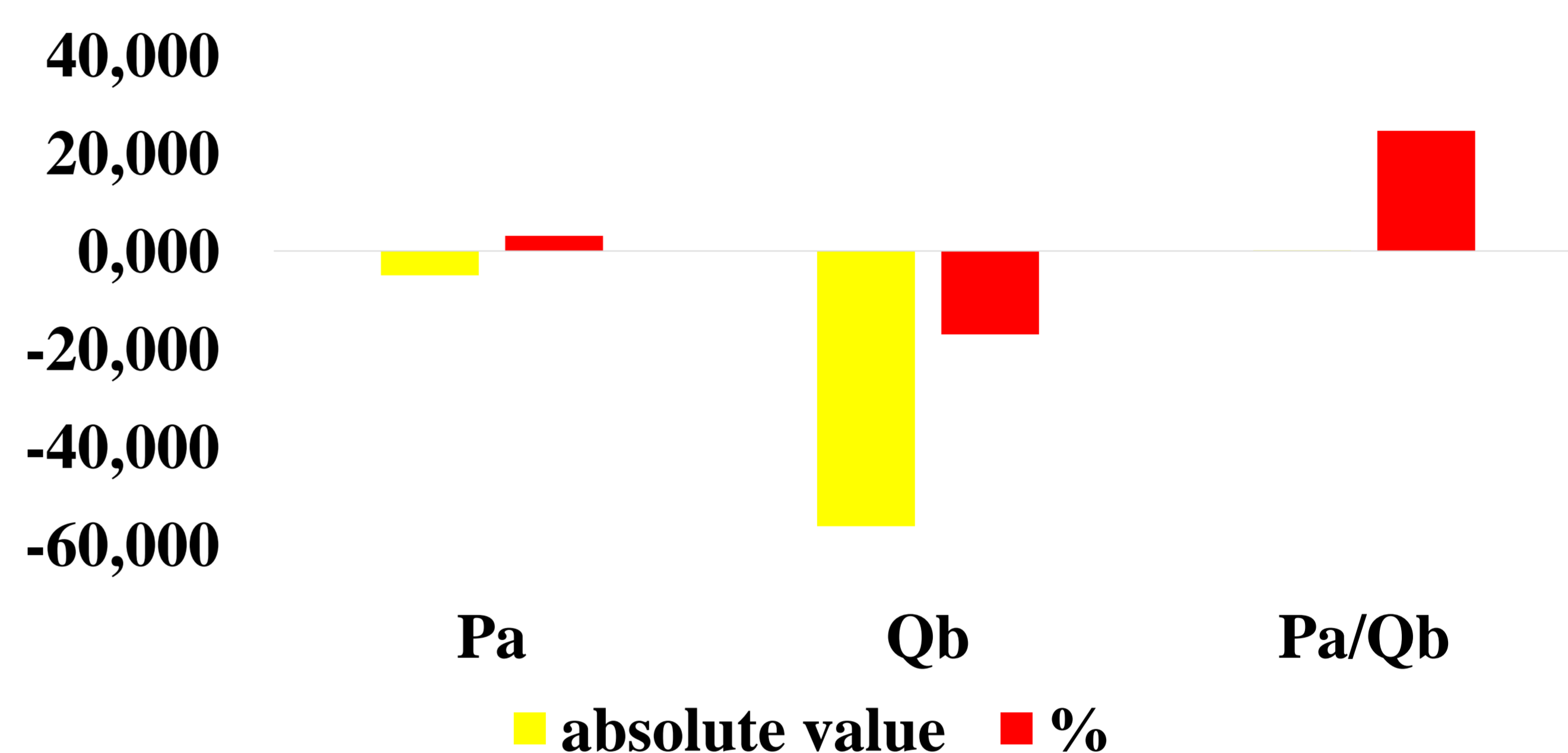
Venous pressure	N. positive	N. positive at Qb = 400 ml/min
1° Quartile (n=26)	5 pts (15 pos)	3 pts (6 pos)
2° Quartile (n=28)	8 pts (15 pos)	6 pts (9 pos)
3° Quartile (n=27)	6 pts (18 pos)	5 pts (13 pos)
4° Quartile (n=26)	4 pts (7 pos)	3 pts (6 pos)

**Figure 4.** We observed a greater occurrence of QBST positivity at a QB of 400 ml/min in patients with a higher Pa/Qb while the ratio Pv/Qb was less predictive of vascular access dysfunction.



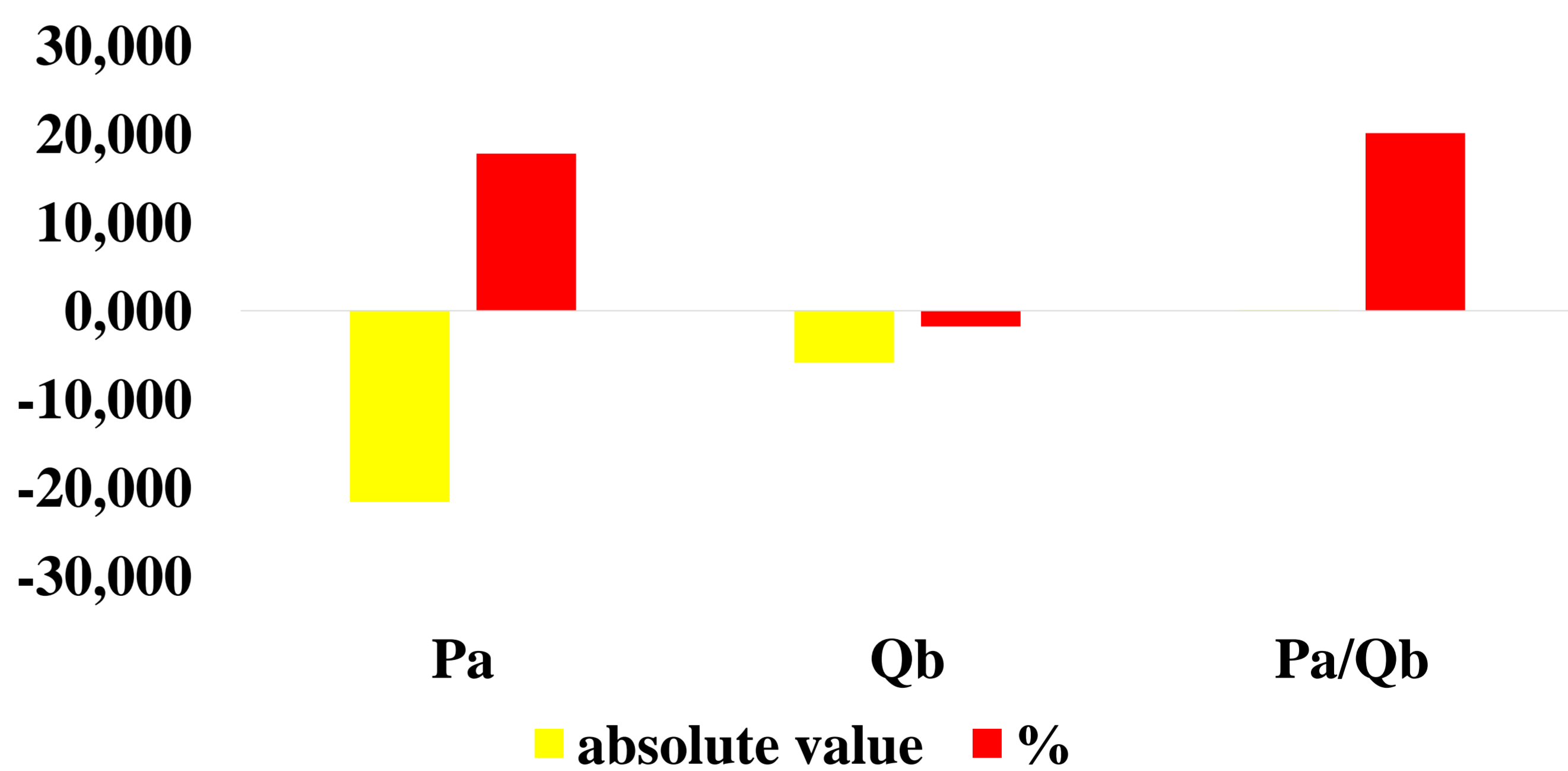
**Clinical case 1.** One patient was diagnosed a 3 cm stenosis of the venous side of the AVF because of persistent positivity of the QBST. Of note, there was a 24% increase of Pa/Qb ratio from the beginning of the observation, an increase higher than the single rise in Pa (3%) or the fall in Qb (17%).

### Change in different parameters between month 1 and month 6



**Clinical case 2.** The second patient was diagnosed with an axillo-subclavian vein stenosis because of the appearance of upper limb edema and collateral circles in spite of persistently negative QBST or Doppler scan of the brachial artery.

### Change in different parameters between month 1 and month 6



## CONCLUSIONS

Our study shows that a single method of surveillance of the vascular access is not sufficient and that the physical examination remains pivotal in the everyday evaluation of the access. To optimize resources, we suggest to perform the Doppler scan of the fistula only when the clinical suspect of a stenosis is strong. In this regard, we suggest to prefer the Pa/Qb ratio and its variations over time (every three months), rather than the Pa or the Qb alone. Nurses should be trained to calculate the Pa/Qb. This training is not expensive and does not require particular skills.

