Non-invasive evaluation of the effects of endothelin receptor antagonists on pulmonary blood flow in patients with pulmonary arterial hypertension at rest and under exercise

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RATIONALE

The pulmonary vascular system is characterized by a high ability to adapt to changing pressures within pulmonary circulation. In patients with pulmonary arterial hypertension (PAH) this ability decreases due to the chronically increased vascular resistance. This leads to the impairment of the pulmonary blood flow (PBF) and the cardiac output at rest and under exercise. Up to the present an effective monitoring of the effects of common PAH therapies on the PBF was only possible by right heart catheterisation. The invasiveness of this method makes it inapplicable as a close monitoring tool. Therefore, we assessed the haemodynamic effects of endothelin receptor antagonists (ERA) in PAH patients by measuring the PBF by the non-invasive measurement device Innocor (Innovision; Denmark) at rest and after physical activity.

METHODS

15 PAH patients (NYHA III and IV; males:females=6:9; mean age 66) underwent routine non-invasive hemodynamic assessment with the Innocor device (inert-gas rebreathing technique) at rest and after exercise (6-minute walk test; 6MWT). These procedures were performed at baseline and every 4 weeks for 3 months after the start of ERA therapy.

RESULTS

The directly measured parameter by the Innocor is the PBF. PBF at rest was 3.10.8 l/min at baseline, 3.9±1.1 l/min at week 4 (+27.9%; p=0.006), 4.3±1.3 l/min at week 8 (+17.6%) and 3.6±0.8 l/min at week 12 (+19.9%; p=0.008). PBF values after exercise showed an initial increase of blood flow of 26.2% after 4 weeks (p=0.023), which remained stable over the entire observational period (22.4% at week 8; 28.5% with p=0.004 at week 12). The walking distance assessed by the 6MWT showed an increase of 9% at week 4, 15% at week 8 and 14% at week 12 (p=0.0007). Also, a change of NT-proBNP levels was detected and showed an anti-parallel behaviour to the assessed PBF values.
Changes of PBF at rest

CONCLUSION

We used for the first time the device Innocor to evaluate at close intervals changes of the PBF in patients with PAH under ERA therapy. Our data show a significant increase of PBF both at rest and after exercise consistent with the simultaneous reduction of NT-proBNP levels and the improvement of the walking distance. These data support the efficacy of this new device in PAH monitoring.