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EDITORIAL COMMENT

Safety and efficacy of balloon pulmonary angioplasty in a Portuguese pulmonary hypertension expert center: A step in the right direction

Segurança e eficácia da angioplastia pulmonar por balão num centro português de referência em hipertensão pulmonar: um passo na direção certa

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Balloon pulmonary angioplasty (BPA) is a complex endovascular technique with a demanding learning curve that is rapidly expanding for the treatment of chronic thromboembolic pulmonary hypertension (CTEPH) patients not eligible for surgery.[1] Pulmonary endarterectomy (PEA) remains the treatment of choice, as it is potentially curative with established short- and long-term benefits, but is not possible in 40% of patients due to distal disease or comorbidities.[2] Moreover, up to 30% of operated patients may have persistent pulmonary hypertension (PH).[3] In both cases, pulmonary arterial hypertension (PAH)-targeted therapy has proven, albeit limited, efficacy.[4]

In the last five years, increasing observational data have documented the efficacy of BPA in inoperable CTEPH patients, consistently demonstrating improved hemodynamic, clinical and biomarker parameters.[5] Complications following BPA are not rare and have been a matter of concern in the past. Complication rates have improved in recent series and do not exceed 11% except for one series with 36%.[6] Periprocedural mortality is usually less than 2%. More recently treated patients have greater hemodynamic improvements with fewer complications.[7] Lung injury is the principal complication following BPA and is associated with vascular injury and severely impaired hemodynamics. Advances in the BPA technique and strategy have succeeded in reducing vascular injury, improving the safety of the procedure.[7]

The article by Calé et al. in the current issue of the *Journal*[8] is the first reported experience in Portugal of BPA for the treatment of CTEPH patients and an example of successful implementation of a BPA program on the part of a multidisciplinary CTEPH team. A series of 11 CTEPH patients, inoperable or with persistent/recurrent PH, underwent BPA in a total of 57 sessions. Assessment at baseline and at six-month follow-up enabled assessment of efficacy and safety. The results are in line with those reported in larger contemporary series showing clinical and hemodynamic improvement. Minor complications were recorded in 25% of patients, but no major complications or mortality.

Despite growing experience and progressively improving results with the BPA technique, several important issues remain to be clarified. One is the need for a better understanding of the mechanisms involved in the vascular effects

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of BPA, somewhere between one week and several months after the procedure. New treatment goals are also being proposed that challenge the standard of achieving a mean pulmonary artery pressure below 35 mmHg while addressing all accessible lesions. Different populations, such as the elderly, might need different goals.[5] Clarifying these aspects will certainly improve patient selection and strategy.

As experience increases, the issue of appropriate patient selection for BPA is becoming more and more important. There may be an overlap between BPA and PEA regarding accessible lesions at segmental and subsegmental level. In addition, some data are beginning to suggest similar results between BPA and PEA.[6] New target BPA populations, like operable patients with high surgical risk, and different hybrid strategies combining BPA and PEA are starting to be considered.[5]

The role of PAH-targeted therapy in conjunction with BPA is also an open question. In most contemporary series, including the one reported in this issue, the majority of patients undergoing BPA are already on specific PAH therapy. The fact that these different therapeutic modalities target different territories, and that a less severe baseline hemodynamic state influences the safety of BPA, are good arguments in favor of this practice, but there is no definite evidence in this field. Comparisons between BPA and riociguat for inoperable CTEPH based on meta-analyses and one multicenter controlled trial point to a superior effect for BPA.[5]

Properly addressing all the current questions regarding CTEPH treatment will in many cases require randomized controlled trials, if possible with head-to-head comparisons between therapies. The expertise and sample volume required would be expected to limit such trials to high-volume centers.[9]

Advances in imaging and interventional catheter techniques are likely to emerge in the near future and will certainly result in better BPA results.

CTEPH is a complex and severe disease involving different pathological mechanisms that coexist in variable degrees and are yet to be fully understood. At present there are three established therapeutic modalities targeting different pathological compartments that may be associated in multiple ways. Generating robust evidence and defining safe and effective rules leading to hybrid strategies is a challenging task.

Epidemiological data classify CTEPH as a rare disease. Taking into consideration both the fact that CTEPH is underdiagnosed and undertreated[10] and the growing awareness developing around this disease, it is reasonable to expect a rise in CTEPH incidence that will inevitably cause more difficulties in the near future. The development of BPA programs like the one reported here is certainly a step in the right direction for improved care and resources.

Conflicts of interest

The author has no conflicts of interest to declare.

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