The modern surgical treatment for chronic thromboembolic pulmonary hypertension (CTEPH), the pulmonary thromboendarterectomy (PEA), has improved the symptoms and prognosis in patients with this untreatable disease. In accordance with progress in the surgical treatment in CTEPH, medical treatment of pulmonary arterial hypertension (PAH), another important etiological category of pulmonary hypertension (PH), has been in progress and also considered useful for CTEPH, because CTEPH may also show high pulmonary artery pressure and the resultant damage to the pulmonary arterioles, the same pathophysiology as in PAH. Therefore, the vasodilators used for PAH may also ameliorate the symptoms and improve prognosis in patients with CTEPH.

In this issue of the Journal, Dr Nishimura et al report an improvement of prognosis in patients with CTEPH after administration of the contemporary pulmonary vasodilators, sildenafil and bosentan, developed for PAH. They divided their cohort into 3 chronological categories: the first group of the patients was diagnosed during 1986 to 1998 (13 years); the second group was during 1999 to 2004 (6 years); the third group was during 2005 to 2010 (6 years). The modern pulmonary vasodilators for PAH were used in 9% of the first patient group, 24% of the second group, and 70% of the third group. The 5-year survival in the third group was 89% compared with 60% in the first group with a significant difference, meaning the new pulmonary vasodilators, including sildenafil and bosentan, improve the prognosis of patients with CTEPH.

Concerning the prognosis of patients with CTEPH before the advent of contemporary vasodilators specific for PAH, there are very few reports. The most cited article is by Dr M. Riedel published in 1982, a long long time ago. Actually we have an excellent report on this published in Japan, as you may know or not. It was written in 1997, by Dr N. Nakanishi in the Cardiovascular Center, but in Japanese. If it had been written in English, it would have been a monumental paper. According to that report, prognosis had nothing to do with pulmonary arterial pressure (PAP) but was related to pulmonary vascular resistance (Figure). Interestingly enough, the 5-year survival in these 3 reports without brand-new vasodilators was similar: in

Figure. (A) Survival according to initial pulmonary artery pressure (PAm). Survival curves are shown according to the pulmonary artery pressures measured at diagnosis. (B) Survival according to initial total pulmonary resistance (TPR). Survival curves are shown according to the total pulmonary resistance measured at diagnosis (Reproduced with permission from Nakanishi et al.9). NS, not significant.

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Second Department of Medicine, Division of Cardiology, Kyorin University School of Medicine, Tokyo, Japan
Mailing address: Toru Satoh, MD, Second Department of Medicine, Division of Cardiology, Kyorin University School of Medicine, 36-20-2 Shinkawa, Mitaka Tokyo 181-8611, Japan. E-mail: tsatoh2008@mc.com
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Riedel’s series approximately 60% (mean PAP: 28 mmHg, determined by my calculation based on the data reported); in Nakanishi’s report, it was 58% (mean PAP: 44 mmHg); in Nishimura’s paper in the first-group patients, it was 55% (mean PAP: 40 mmHg). Riedel’s report included patients with acute pulmonary thromboembolism and did not demonstrate the genuine prognosis of the patients with CTEPH. You can see the very low mean PAP in the overall patient group in Riedel’s report (he divided the patients into varieties of categories). I assume that Nakanishi’s report shows the standard statistics on CTEPH prognosis in the era of no vasodilators. I think we should refer to his results more when we discuss the natural history of CTEPH.

Anyway, Nishimura’s data indicate the improved prognosis of CTEPH patients with the newly-developed vasodilators of bosentan and sildenafil, consistent with our experiences of subjective and hemodynamic amelioration of CTEPH patients. Nowadays in Japan, PEA has been replaced by pulmonary angioplasty, more casually and noninvasively performed than angioplasty, based on his report. In our center in 2008, it was started in Okayama Medical Center in around 2005 and independently in our center in 2008. Both centers have been cooperating to develop the technique into a safer and more efficient entity. Pulmonary angioplasty was first used to target peripheral lesions and now has been safely applied to more central lesions using a sophisticated technique of primary partial dilatation of the central lesion with an additional complete dilatation in 1 or 2 weeks (unpubl. data). The prognosis for pulmonary angioplasty is reported to be better than medical treatment. Concerning the difference between the 2 invasive treatments, we have compared the medium- to long-term prognoses of CTEPH between PEA and pulmonary angioplasty (unpubl. data). According to our data, the prognoses of the 2 therapies were statistically comparative. However, pulmonary angioplasty can be repeated several times and be performed in patients with prior PEA, contrary to the difficulty of repeating PEA.

When we come to treat a patient with CTEPH, we first use the new vasodilators, mostly with success, meaning that the patients’ symptoms and hemodynamics improve and are maintained in a steady state for a certain period, proved by Nishimura’s study. But some do not respond to medical treatment and their condition is aggravated without the invasive treatment of mechanical removal of the organized thrombi. The rate of those patients seems to be 10% in 5 years according to Nishimura’s data and those patients have been treated with invasive methods in terms of prognosis. An indication for pulmonary angioplasty now extends to patients with less severe PAPs than the indication of PEA for its less invasiveness and easy accessibility with the same mortality, according to our unpublished data.

Nishimura’s report gives us the basic statistics on the hemodynamic and prognostic changes after pulmonary vasodilators usually used for PAH. We will analyze the future data produced from the new invasive procedure, pulmonary angioplasty, based on his report.

Disclosure

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