

A new method for right ventricular endomyocardial biopsy via the femoral veins: a novel approach employing a right ventriculography catheter (Nishiya type)

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Summary. We have devised a new method for right ventricular endomyocardial biopsy, in which the use of a right ventriculography catheter (Nishiya Type) allows us to ensure the introduction of a guiding sheath (Cordis, right-angled long sheath) to the apical portion of the right ventricle by way of the femoral vein. With this method, we have biopsied the endomyocardium in 52 patients during the last 4 years. In each case, it only took us several minutes to complete the biopsy procedure. Neither failed applications nor significant complications were seen. We believe that this technique provides a clinically beneficial means as it enables us to readily and safely achieve right ventricular endomyocardial biopsy.

Key words: Endomyocardial biopsy – Femoral venous approach – Right ventriculography catheter (Nishiya type)

Introduction

Endomyocardial biopsy is a useful means for the diagnosis of idiopathic cardiomyopathy and to assess the degree of rejection after cardiac transplantation. It is, however, not always easy to guide a bioptome accurately to the apical portion of the right ventricle through the femoral vein [1]. Despite many attempts using various techniques [2–5], none of them has proved to be a method capable of addressing all types of cases, since the size of the right ventricle varies depending on age and disease.

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The present study describes a method which we have devised, in which biopsy can be performed from the apical septum by employing, as a guiding catheter, a right ventriculography catheter (Nishiya Type) [6] which we developed to easily lead a long sheath far enough to reach the optimal target site in the septum.

Materials and methods

This technique employs our right ventriculography catheter (Nishiya type) as a guiding catheter to easily direct a ready-made long sheath (Cordis, Miami FL, USA right-angled Teflon sheath) down to the right ventricular apical portion. This ensures safe delivery of the bioptome (Cordis, Bipal 7 disposable biopsy forceps), inserted into the sheath, to the apical septum (Fig. 1). From March 1995 to February 1999, biopsy was conducted in 52 patients (32 males and 20 females, age ranging from 16 to 78 years; 34 patients with cardiomyopathy, 13 with myocarditis, 3 with ischemic heart disease, and 2 with ventricular tachycardia).

The size of the right ventriculography catheters (adult type L, M, and S; pediatric type L, M, and S) was changed according to the size of the right ventricle involved. The most frequently used were the adult S and M sizes.

Clinical manipulation includes the following steps.

(1) First, the catheter with the J-shaped guide wire is directed to the upper portion of the right atrium along with the long sheath. With RAO projection, the guide wire is immediately extracted and the catheter enters the apical portion of the right ventricle. Then, the long sheath is guided toward the pigtail tip (Fig. 2).

(2) Second, the guiding catheter is removed and the slightly flexible long sheath remains indwelled near the apical portion, forming a moderate curve.

(3) Finally, a bioptome, to which a semicircular bend is given beforehand, is inserted in its closed state into the long sheath tip. After making sure of the location of

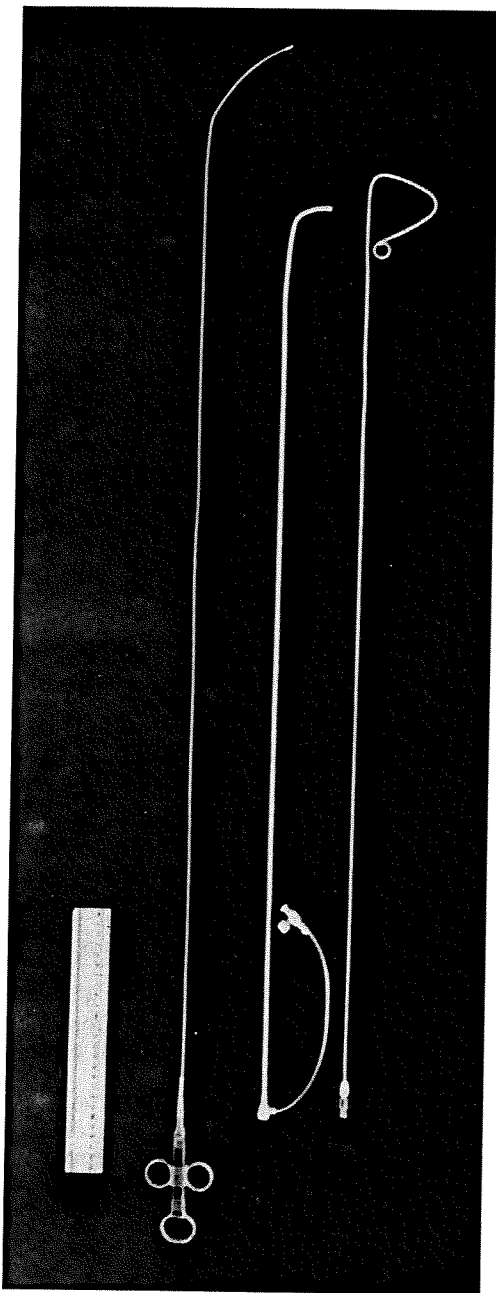


Fig. 1. Left to right: a prebent biptome (7F), a 7F long sheath, and a right ventriculography catheter (7F)

the septum with the LAO position (where the long sheath lies in almost a straight line), biopsy is conducted as soon as the forceps is pushed out of the long sheath with the RAO projection (Fig. 3). Since the right ventricle has almost the same morphology in all patients, except for atypicality due to specific diseases, and the location of the septum is also nearly the same, successful biopsy can be achieved unless the forceps fail to face towards the septum.

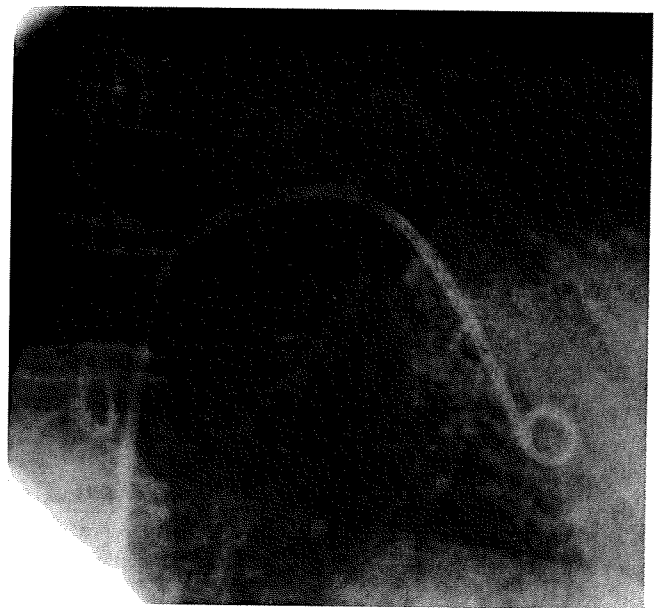


Fig. 2. The cinefluoroscopic image shows that the right ventriculography catheter contained in the long sheath is positioned near the apical septum

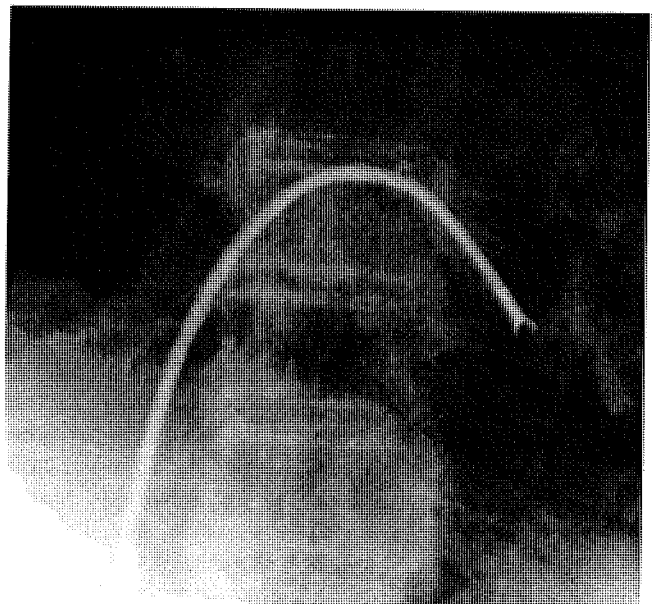


Fig. 3. When the bent biptome contained in the long sheath comes out and is allowed to open, it is situated near the apical septum

Results

Using this technique, the endomyocardium was biopsied in 52 patients, mainly with cardiomyopathy and myocarditis, over the past 4 years. In every case,

biopsy was successfully completed by a singly operator within several minutes without giving rise to any significant complication. In addition, the specimens were of an adequate size.

Discussion

Endomyocardial biopsy developed by Konno was indeed a revolutionary breakthrough in the antemortem diagnosis of idiopathic cardiomyopathy [7]. In recent years, it has also been considered to be essential in assessing the degree of rejection after cardiac transplantation [1, 2, 8]. Konno's contribution to cardiology cannot be overstated.

Nevertheless, Konno's biopsy forceps as well as its modification, the Stanford right ventricular endomyocardial biopsy forceps [8], required highly skilled manipulations, and could sometimes damage major cardiac vessels because of their rigidity [2]. Indeed, some are of the opinion that biopsy should be performed by specialists only, as complications usually result from manipulation by inexperienced operators [8]. In front-line centers where the number of cases undergoing biopsy is too small to necessitate the presence of biopsy specialists, less skilled operators may carry out biopsy in an emergency (for example, in a patient with acute myocarditis). Given the realities of the clinical sites, it is necessary to work out an easy, safe, and accurate way to achieve biopsy. In the light of ensured insertion into the right ventricle, the upper limb vein approach is much easier. Nevertheless, the femoral venous approach has its advantages in that the biopsy can be performed as a step of right or left heart catheterization and, at the same time, damage to the lungs and vessels during introduction of the biptome can be minimized. Thus, the challenge is to find how easily and safely the long sheath can be directed to the apical portion of the right ventricle. The majority of the femoral venous approaches published to date involve the use of the Lehman catheter of a Teflon sheath as the guide wire to lead a flexible biptome to the right ventricle. The Lehman method can, however, impair the right ventricular outflow tract [9] and has an increased thickness of 9 F. On one hand, the standardized shape of the Tampa Bay catheter [2] may limit applicability to subjects. In addition, methods using a ready-made curved long sheath [5] have similar problems. However, preshaping [3] or custom-making of a guiding sheath for each case is very troublesome. In contrast, the right ventriculography

catheter (Nishiya type) developed by us has already been introduced into the market and comes in a variety of sizes and thicknesses, permitting introduction into the apical right ventricular portion, regardless of age and the size of the subject's right ventricle. Furthermore, it is possible to carry out right ventriculography simultaneously, if necessary. Preshaping of the biptome makes it possible to sample the endomyocardium from various directions. This consequence is of the same significance as the fact that relatively rigid conventional catheters have given place to soft and easily operable pigtail or balloon catheters.

Using this method, endomyocardial biopsy was performed in 52 patients, mainly with cardiomyopathy and myocarditis, during the past 4 years. No failure or complications attributable to this technique were observed. We believe that this technique provides significant clinical benefits.

Acknowledgment. This paper is dedicated to the memory of the late Prof. Soji Konno, a pioneer of endomyocardial biopsy, who was Dr. Nishiya's respected mentor.

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