

# ECHOCARDIOGRAPHY IN THE DIAGNOSIS OF PERICARDIAL EFFUSION: A HISTORICAL PERSPECTIVE

Tsung O. Cheng, M.D.

The George Washington University Medical Center, Washington, D.C.



T.O. Cheng, M.D.

Two recent publications painted a fascinating picture of Dr. Paul Dudley White by describing two little-known stories about this Father of American Cardiology.<sup>1-3</sup> I highly recommend that every physician read them, especially cardiologists. The title of the article by Dr. Feigenbaum<sup>2</sup> — “Paul Dudley White on echocardiography. ‘Nobody is perfect’” — is particularly amusing. He mentioned that “the field essentially remained dead until we published our report on the use of cardiac ultrasound to detect pericardial effusion in 1965.”<sup>4</sup>

The use of echocardiography to diagnose pericardial effusion began in China even earlier.<sup>5</sup> In 1961, Hsu in Shanghai (Figure 1) reported the first use of A-mode echocardiography in diagnosing pericardial effusion in 5 patients.<sup>6,7</sup> Hsu described the increased

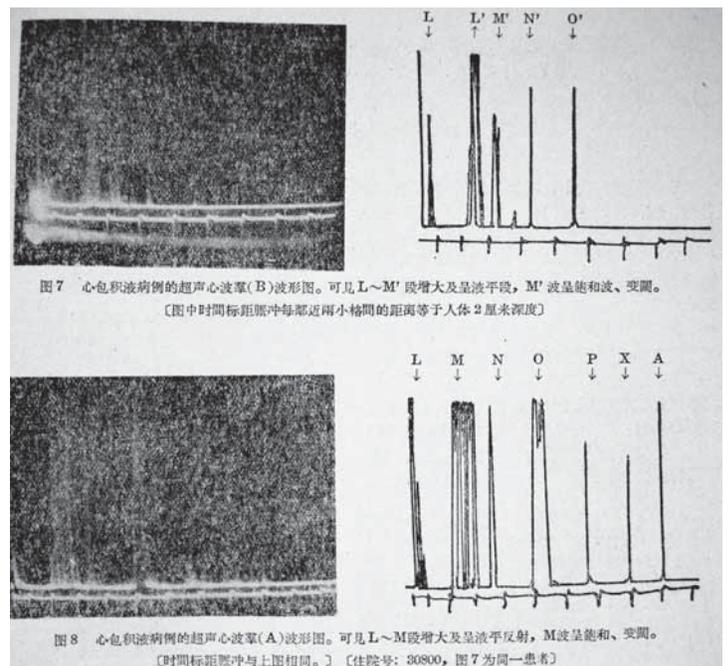
distance between the heart and pericardium as being characteristic of pericardial effusion (Figure 2). He further discussed the difficulty in diagnosing small pericardial effusion because of its tendency “to accumulate behind the heart.”<sup>7</sup> In Wuhan, central China, Wang and Wang also started using echocardiography to diagnose pericardial effusion in 1961 and published a series of 51 patients in 1973.<sup>8</sup> They were unable to diagnose 3 patients with pericardial effusion of less than 50 mL, thus



**Figure 1.** Professor Chih-Chang Hsu, a.k.a. Zhi Zhang Xu, who autographed this photograph to this author in 2005.

yielding a diagnostic accuracy of 94%. Wang further described echocardiography being very useful in guiding pericardiocentesis.<sup>8</sup> According to Feigenbaum et al., “China was another country where cardiac ultrasound was used in the early years. ... Unique contributions of the Chinese investigators included fetal echocardiography and contrast echocardiography using hydrogen peroxide and then carbon dioxide.”<sup>9</sup> Contrast echocardiography is now a well-established technique that is useful in studying various cardiovascular disorders.

China, indeed, has made many important contributions to echocardiography from very early on. However, much of the brilliant pioneering work of Hsu, Wang, and other Chinese physicians was little known to the outside world due to the political turmoil in China during the 1960s.<sup>5</sup> It was only after American president Richard Nixon’s historic 1972 visit that China’s closed doors were reopened to the West, revealing the many important contributions by Chinese cardiologists. I say *many* but not *all*: During the Cultural Revolution of the late ‘60s, many Chinese publications were destroyed, lost, or difficult to identify. The names of individual



**Figure 2.** Top figure labeled as “Figure 7” (translated from Chinese): Cardiac echo groups (B) in a case of pericardial effusion. The L-L’ (misprinted in the Chinese legends as L-M’) distance increased with fluid flat segment. L’ (misprinted in the Chinese legends as M’) wave was saturated and became broadened. [Distance between two time markers = 2 cm]. Bottom figure labeled as “Figure 8” (translated from Chinese): Cardiac echo groups (A) in same case of pericardial effusion. The L-M distance increased with fluid flat reflection. M wave was saturated and became broadened, with same time markers as above. In the upper tracing, L represents the parietal pericardium, L’ represents the visceral pericardium, and M’ represents the epicardium. The pericardial effusion lies between L and L’ in the upper figure and L and M in the lower figure.

authors were not allowed to appear in their writings, and only the names of their institutions could be used.<sup>8</sup> This chaotic state of affairs was compounded by the fact that any foreigner’s name, such as Doppler, was not permitted to appear in any Chinese publication.<sup>5</sup> It was nearly impossible to do any kind of accurate literature search for scientific papers published by Chinese scientists during that time. Adding to the confusion was the 1958 introduction and 1979 adoption of the pinyin writing system, which was used to transcribe Chinese characters into the Roman alphabet, replacing the older Wade-Giles system. For example, Zhi Zhang Xu, the name of the

second author in reference 5, was formerly spelled as Chih-Chang Hsu, which appears in references 6 and 7. Very few people would recognize that Zhi Zhang Xu is the same person as Chih-Chang Hsu. The Chinese custom of transposing the first and last names confuses the matter even further.<sup>10</sup>

Despite the myriad political circumstances that shielded the world from Chinese medical contributions, professors and cardiologists such as Hsu and Wang were forging their own research. Feigenbaum mentioned the field being essentially dead until 1965, but the use of echocardiography in diagnosing pericardial effusion was already blooming in parts of China.

## References

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