Diagnostic Efficacy of Radionuclide Ventriculography in Identifying the Location of Accessory Pathway(s) in Wolff –Parkinson –White Syndrome

Sepideh Hekmat, MD; Feridoun Rastgoo, MD; Mohammad Ali Sadr-Ameli, MD; Nahid Yaghoobi, MD; Hassan Firouzabadi, MD; Shahram Seifollahi, MD; Mahmonir Mohammadi, MD

Abstract

Background- Noninvasive methods for identification of accessory pathway(s) (AP) location in pre-excitation syndrome have always been desirable. Given the non-invasiveness and other advantages of radionuclide ventriculography (RVG), this study was performed to verify the efficacy of RVG in determining the location of accessory pathway(s) in patients with Wolff-Parkinson –White (WPW) syndrome.

Methods- Fourteen patients with WPW syndrome were enrolled in this study and they underwent RVG scanning followed by electrophysiologic study (EPS) within a couple of days.

Results- After we compared the scintigraphic and electrophysiologic results, RVG showed that 11 patients had one AP and 3 patients had dual APs. The existence of dual pathways were confirmed by EPS only in two patients .RVG did not identify dual pathways in one patient.

Conclusion- We concluded that RVG scanning could be considered as a noninvasive procedure before EPS. Considering the location of APs, RVG identified their location (in comparison with EPS) in 78.8% of the patients. **(*Iranian Heart Journal.* 2002; 2(4)&3(1): 11-13)**

Key works: accessory pathway < electrophysiologic study < radionuclide ventriculography

Wolff - Parkinson - White (WPW) syndrome is a type of pre-excitation syndrome in which a part or the whole ventricle is activated earlier than it should be by an accessory pathway.

The prevalence of this syndrome in healthy population is about 1.5 per 1000.[1,2] The clinical significance of the diagnosis of WPW syndrome is due to the high prevalence of tachyarrhythmias in these patients.

The diagnostic gold standard for WPW syndrome is electrophysiologic study (EPS). However, given its disadvantages (invasiveness, time–consuming and its cost), it seems reasonable to find an alternative method, which is safer and easier than EPS.

To obtain this goal, we designed this study was with the collaboration of the nuclear medicine and cardiology departments. Gated blood pool (GBP) imaging is a form of radionuclide ventriculography (RVG) which providing valuable information regarding ventricular function, valvular insufficiency, left-to- right cardiac shunts,

From the Department of Nuclear Medicine and Imaging, Shaheed Rajaie Cardiovascular Medical Center, Tehran
Correspondence to: S. Hekmat, MD, Dept. of Nuclear Medicine and Imaging, Shaheed Rajaie Cardiovascular Medical Center, Iran University of Medical Sciences, Vali-Asr Ave, Mellat Park, Tehran, Iran.
Email: s_hekmat@msn.com Fax: +(9821) 2042026

as well as the cardiac electrical conduction system. There are numerous studies dealing with this subject.[1-6]

Materials & Methods

Fourteen patients were enrolled in the study. Among the clinically-diagnosed WPW patients, those with intermittent pre-excitation whose ECGs did not present delta-wave persistently were excluded.

The patients underwent GBP imaging. After an intravenous injection of RBCs radio-labeled with 15-20 mci Tc-pertechnetate, tri-planar (anterior, left anterior oblique and left lateral) images were obtained by single – headed SMV gamma camera, equipped with a high-resolution parallel–hole low energy collimator.

The acquired data were processed by appropriate software and the pattern of electrical conduction on cinematic phase images was assessed by three nuclear physicians who were unaware of the EPS results. Inter-observer discrepancies were re-evaluated and the final decision was registered.

All patients underwent EPS within 1-2 days after scintigraphy by an electrophysiologist who was unaware of the scan results. Eventually the results of the two studies were compared.

Results

The studied population consisted of 9 males (64 .3%) and 5 females (35.7 %).

The frequency of the AP(s) according to the location, obtained from GBP and EPS results, is shown in Tables I and II.

There were 3 dual APs by GBP and 3 by EPS, of which a complete concordance was seen in one patient (Table III).

Table I. GBP-determined locations of APs

Location of AP	Number	Percent (%)
Rt. anterior	0	0
Rt. Lateral	3	21.5
Rt. posterior	4	28.5
Rt. parahisian (anteroseptal)	2	14.2
Rt. Septal	0	0
Rt. posteroseptal	1	7.1
Lt. anterior	1	7.1
Lt. lateral	2	14.2
Lt. posterior	1	7.1
Lt. posterolateral	1	7.1
Lt. posteroseptal	2	14.2

Table II. EPS-determined results

Location of AP	Number	Percent (%)
Rt. anterior	0	0
Rt. lateral	3	17.6
Rt. posterior	4	23.5
Rt. parahisian	2	11.7
Rt. septal	1	5.9
Rt. posteroseptal	1	5.9
Lt. anterior	0	0
Lt. lateral	1	5.9
Lt. posterior	1	5.9
Lt. posterolateral	1	5.9
Lt. posteroseptal	3	17.6

Table III. Comparison of GBP and EPS results in double APS.

GBP	EPS
Rt. lateral Rt. posterior	Rt. lateral Rt. posterior
Rt. Lateral Lt. anterior	Rt. lat Lt. posteroseptal
Rt. posteroseptal Lt. lateral	Rt. posteroseptal
Rt. Posterior	Rt. posterior Rt. septal

Discussion

A number of studies with various scan protocols have been performed to evaluate AP in WPW patients.

Silka, et al. studied 20 children, of whom 12 patients suffered from WPW syndrome, and managed to identify the exact location of the AP in 12 children.[3]

In 1991, Sheinman, et al. studied 21 WPW patients, 15 patients with single AP and 6 with double APs. The scintigram localized the AP in 14/15 and 4/6 accurately.[4]

In another study, 6 patients underwent EPS and phase imaging; a complete agreement between the results was obtained.[5]

In 1984, a group of investigators identified the AP in the right ventricle in 9 patients. In 6 patients, it was identified in the left side, accurately.[6]

With respect to this issue, a few studies have been done with a similar procedure design (tri-planar views) which have shown a sensitivity of about 60% in determining the AP by GBP compared to EPS.

Our results demonstrated the approximate region of the location of the AP in 70.5% of the total pathways. There was one undetected AP in a patient with dual APs by GBP.

GBP is a method, which is more cost-effective, less time-consuming with non-invasive properties. It can act as a guideline for the cardiologist to seek the AP in its approximate area, thus lessening the time required for EPS. On the other hand, EPS provides the opportunity of ablating the AP during the same diagnostic procedure, but at the same time, it is an invasive, lengthy, expensive and labouring procedure for both patient and physician. Moreover it could be logical to perform GBP scanning in patients with WPW syndrome before EPS. Finally, in this study, scintigrams were performed using the planar method. It is possible that tomographic imaging improves diagnostic accuracy.

References

1. Fuster: "Hursts the heart, arteries and veins", vol. 1, 10th ed, Mc Grow hill, U.S.A. Pp 815-818, 2001.
2. Braunwald, E: " Heart disease, a text book of cardiovascular medicine", vol. One, 6th ed, W.B Saunders, U.S.A, Pp 845-855, 2001.
3. Silka, MJ. Phase image analysis of anomalous ventricular activation in pediatric patients with preexitation syndromes or ventricular tachycardia. Am Heart J 125 (2): 372-80, 1993.
4. Scheinman O, Neff M. Phase triangulation of accessory pathways in patients undergoing catheter ablation of posteroseptal pathways. Clin Electrophysiol 14(6): 1072-85, 1991.
5. Lyons K: Cardiovascular Nuclear Medicine. 1st Ed, Appleton and Lange, U.S.A, pp. 221-226, 1988.
6. Nakajima, K. Phase analysis in the WPW syndrome with surgically proven accessory pathways. J Nucl Med 25(1): 7-13, 1984.
7. Wagner H. Principles of Nuclear Medicine. 2nd Ed, Harcount Brace and Co., U.S.A, pp. 851-855, 1995.
8. Murray I. Nuclear Medicine in Clinical Diagnosis and Treatment. Vol. II, 3rd Ed, Churchill-Livingstone, U.S.A, pp. 326, 1998.