Prezado Adrianinho tentaré responderte por last time. Este pacientinho tem um WPW com feixe anômalo em paralelo localizado na **parede livre posterior direita do VD** (**ponto 4**) **ou no ponto 3 (lateral direita)**
correspondente a:
1) WPW tipo A da classificação de Rosembaum;
2) WPW tipo II da classificação europeia;
3) Ponto 4 de Gallangher ou posterior direita;
4) Região IV de Lindsay.

Quais os critérios deste diagnóstico:
1) Derivações transicionais V2-V3-V4 de maior voltagem;
2) **V1 de pequeno voltagem ou até negativo em contraposição com o resto das precordiais muito positivas.** Porque isto

![Diagrama de coração](image)

Resposta: porque a alça de despolarização ventricular se dirige de trás para frente e de direita para esquerda ficando perpendicular a V1 (** + 120 graus**);
Adrian dice "El ECG muestra onda R alta en V1 (vieja tipo A de Rosembaun, como Ud dice, o sea en el anillo mitral y no tricuspideo). Entonces él vió otro ECG V1 no tiene R amplia según me parece. V1 es pequeño en voltaje no es alta apneas a partir de V2 que comienza a aumentar. Ahora entiendes?

Pode suscitar duvidas com todas as causas que ocasionem forças anteriores proeminentes:
1) Área eletricamente inativa ínfero-dorsal;
2) SVD;
3) Bloqueio divisional ântero-medial do ramo esquerdo.
4) Onda delta sempre negativa em aVR;
5) Onda delta sempre positiva em DI e aVL;

Mando a seguir los algoritmos/

LOCATION OF ACCESSORY PATHWAYS IN THE WPW SYNDROME USING ECG/VCG

Lindsay BD, Crossen KJ, Cain ME. Concordance of distinguishing electrocardiographic features during sinus rhythm with the location of accessory pathways in the Wolff-Parkinson-White syndrome. Am J Cardiol 1987 May 1;59(12):1093-102

Knowledge of the location of accessory pathways in patients with Wolff-Parkinson-White (WPW) syndrome is pertinent to patient management. Despite the recognition that features of delta waves present during maximal preexcitation reflect ventricular activation at different sites around the anulus fibrosus, the value of electrocardiographic patterns observed during sinus rhythm, when ventricular preexcitation is often not maximal for identifying accessory pathway locations, has
not been determined. In this study, 12-lead electrocardiograms recorded during sinus rhythm from 66 patients with WPW syndrome were analyzed for delta-wave polarity, QRS axis in the frontal plane, the pattern of precordial R-wave transition, and concordance between electrocardiographic patterns and the site of the accessory pathway determined using catheter and intraoperative computer mapping. Electrocardiograms from patients with left lateral sites showed negative delta waves in leads I or aVL, a normal QRS axis and early precordial R-wave transition (20 of 24 patients); left posterior sites manifested negative delta waves in II, III and aVF and a prominent R wave in V1 (14 of 16 patients); posteroseptal sites had negative delta waves in II, III and aVF, a superior QRS axis and an R less than S in V1 (all 16 patients); right free wall locations manifested negative delta waves in aVR, a normal QRS axis, and R-wave transition in V3-V5 (6 of 6 patients); and anterior septal sites had negative delta waves in V1 and V2, a normal QRS axis, and R-wave transition in V3-V5 (4 of 4 patients). Characteristic electrocardiographic patterns were not observed in 5 patients because of insufficient preexcitation. Each had a left lateral or left posterior pathway. Overall, the proposed electrocardiographic criteria derived during sinus rhythm identified correctly the accessory pathway location in 60 of 66 patients (91%). Thus, the electrocardiogram provides the physician with a reliable noninvasive means of regionalizing the location of accessory pathways in patients with WPW syndrome.

PMID: 3578049 [PubMed - indexed for MEDLINE]

Milstein S, Sharma AD, Guiraudon GM, Klein GJ. An algorithm for the electrocardiographic localization of accessory pathways in the Wolff-Parkinson-White
Accessory pathway location in the Wolff-Parkinson-White syndrome influences the success and morbidity of nonpharmacological therapies, so that an estimate of accessory pathway location is relevant to the practicing physician. We derived an algorithm for accessory pathway localization based on the surface electrocardiogram; we tested it in a population of 141 patients with the Wolff-Parkinson-White syndrome in whom accessory pathway localization was made by electrophysiological and/or intraoperative mapping. The goal of the algorithm was to localize the accessory pathway to one of four anatomic regions, namely, left free wall, posteroseptal, anteroseptal or right free wall by using a simple, easy-to-apply scheme. Each of two observers, blinded to the results of mapping, correctly identified the anatomic location of 91% and 90% of pathways, respectively. We conclude that a simple algorithm utilizing the 12-lead electrocardiogram can provide a valuable first approximation of accessory pathway location in the Wolff-Parkinson-White syndrome.

PMID: 2440006 [PubMed - indexed for MEDLINE]
The resting 12 lead electrocardiogram and vectocardiogram were reviewed in 47 patients with the Wolff-Parkinson-White syndrome (a) who had pre-excitation on the resting 12 lead electrocardiogram, (b) who had a single anterograde conducting accessory pathway assessed and located during preoperative electrophysiological study and during epicardial mapping at operation, and (c) in whom surgical division of the accessory pathway resulted in loss of pre-excitation. The site of the accessory pathway established during operation was compared with that established by evaluating the polarity of the delta wave and QRS complex on the resting 12 lead electrocardiogram. The electrocardiogram was assessed by the Rosenbaum criteria (Wolff-Parkinson-White type A, left-sided pathway; or type B, right-sided pathway), the Gallagher criteria (atrial pacing resulting in maximal pre-excitation), and the World Health Organisation criteria (a composite of previous studies). The Gallagher and World Health Organisation criteria were derived from patients demonstrating maximal pre-excitation that often required atrial pacing. The present study was designed to determine whether these criteria could be accurately applied to the resting 12 lead electrocardiogram on which the degree of pre-excitation was variable. The Rosenbaum criteria correctly identified a left sided accessory pathway in 26 of 34 patients and a right-sided accessory pathway in nine of 13 patients. The Gallagher and World Health Organisation criteria correctly identified the location in only 15 (32%) of the 47 patients. The resting vectorcardiogram was inaccurate for locating the accessory pathway.
Operative and ablative therapy in the Wolff-Parkinson-White syndrome requires accurate localization of accessory atrioventricular pathways. A reasonable first approximation to pathway location can be obtained by noninvasive techniques, the 12-lead electrocardiogram being the most readily available of these. Accurate characterization of the number and anatomic localization of accessory pathways still requires invasive electrophysiological assessment. The most useful technique for accessory pathway localization remains endocardial atrial mapping of the tricuspid and mitral (via the coronary sinus) ring during atrioventricular reciprocating tachycardia and ventricular pacing. Other techniques provide important confirmatory evidence and may be the only guides to accessory pathway location in selected individuals.
[Article in French]

Centre de Stimulation cardiaque et de Rythmologie, Hopital Jean Rostand, Ivry.

A new algorithm has been developed for locating the anomalous conduction pathway from the ECG which is based on 62 cases of Wolff-Parkinson-White syndrome with a single anomalous conduction pathway, located by epicardial mapping, i.e. 28 on the free edge of the left ventricle (FL), 22 posterior septal, including 11 left (LPS) and 11 right (RPS), 8 right lateral (RL) and 4 right anterior septal (RAS). Criteria use the orientation of the delta wave and the QRS complex in the right precordial leads and the frontal plane, combined with the presence or absence of left or right ventricular hypertrophy. The algorithm is worked out in 15 steps, each criterion being applied only if the preceding criterion has not been observed. It identifies 100 per cent of the study population. This high specificity has been checked on independent series which include 55 FL pathways, 9 LPS, 17 RPS, 10 RL and 5 RAS. Only 2 LPS pathways were identified as FL and 1 RPS pathway as RL corresponding, perhaps, to "borderline" cases. The ECG thus remains the simplest non invasive examination for locating the ventricular origin of anomalous conduction pathways.

PMID: 2369059 [PubMed - indexed for MEDLINE]

The scalar electrocardiograms (ECGs) and vectorcardiograms (VCGs) of 41 patients with Wolff-Parkinson-White (WPW) syndrome were used to compare the accuracy of these techniques in the identification of the site of preexcitation. The location of the accessory pathway (AP) was determined by endocavitary electrophysiologic studies in all patients and the location was confirmed during intraoperative epicardial mapping in 28 of them. The ECGs were classified according to Gallagher's criteria and with Milstein’s algorithm, whereas the VCGs were classified according to a new two-step algorithm. The presence of multiple accessory pathways and coexisting myocardial infarctions were major limitations in both the VCG and ECG classification procedures. In patients with a single accessory pathway, three AP localizations (right free ventricular wall, posterior, or left free ventricular wall) were identified with the first step of the VCG algorithm, with an overall sensitivity (96.5%), specificity (90.7%), and positive predictive values (80%) that were greater than those obtained with the ECG Milstein algorithm (77.1%, 91.5%, and 75%, respectively). The second step of the VCG algorithm made it possible to identify an AP location in one of the following sites: anterior right, lateral right, posterior right, posterior left, lateral left, or anterior left ventricle. The overall sensitivity, specificity, and positive predictive values were greater for the second step of the VCG
algorithm than for the ECG criteria proposed by Gallagher (43.6% versus 39.3%, 92.1% versus 87.4%, and 51.5% versus 33.3%, respectively). It was concluded that the VCG seems to be more specific and sensitive than the ECG in the identification of the preexcitation site and should be given preference in the initial evaluation of the WPW syndrome.

PMID: 2309602 [PubMed - indexed for MEDLINE]


Department of Surgery (I), Kanazawa University School of Medicine, Japan.

Eight sets of electrocardiographic (ECG) criteria for the localization of accessory conduction pathway (ACP) were evaluated on 182 patients with a single ACP. The Rosenbaum criteria identified 78.6% of the left-sided and 94.0% of the right-sided ACPs. Four of the other seven sets of criteria demonstrated a sensitivity higher than 70.9% and six showed a specificity higher than 74.9% in the 4-region ACP localization. The ECG feature of the delta wave polarity in lead V1 correctly localized the ACP to one of three broad regions in 162 of 182 patients with an overall specificity of 94.5%. The study indicates that (1) the 12-lead ECG is of practical value for initial ACP localization; (2) a type A ECG is almost invariably associated with a left-sided ACP, while type B may occur with any ACP location; (3) the polarity of the delta wave is the most important ECG feature, and the polarities of the delta wave and main QRS
complex in lead V1 play an important role in ACP localization.

PMID: 1645060 [PubMed - indexed for MEDLINE]


Department of Cardiology, Academic Hospital, Maastricht, The Netherlands.

The 12-lead electrocardiograms of 50 patients with 1 anterogradely conducting accessory pathway were analyzed to obtain characteristics of electrocardiographic findings in the midseptal, anteroseptal, true posteroseptal and right free wall accessory pathway locations. Locations were confirmed by surgery (33 patients) or radiofrequency catheter ablation (17 patients). This study analyzed (1) QRS in the frontal plane, (2) delta wave axis in the frontal plane, (3) the angle between QRS and delta wave axes, (4) the R/S ratio in lead III, (5) negativity of delta wave in inferior leads, and (6) the R/S ratio in precordial leads.(ABSTRACT TRUNCATED AT 250 WORDS)

PMID: 8256703 [PubMed - indexed for MEDLINE]

OBJECTIVES. In this study, we propose a new algorithm for accessory atrioventricular pathway localization using a 12-lead electrocardiogram (ECG). BACKGROUND. Radiofrequency catheter ablation produces a very discrete lesion, and ECG localization based on surgical dissection is obsolete. METHODS. Stepwise discriminant analysis was used to assess the relation of 18 pre-excited ECG (QRS duration > 100 ms) variables to the site of successful ablation in 93 patients. The most discriminating variables were combined to form rules for each location. The ECGs were retested by these rules to determine predictive accuracy. RESULTS. If the precordial QRS transition was at or before lead V1, the pathway had been ablated on the left side. If it was after lead V2, the pathway had been ablated on the right side. If the QRS transition was between leads V1 and V2 or at lead V2, then if the R wave amplitude in lead I was greater than the S wave by > or = 1.0 mV, it was right-sided; otherwise, it was left-sided (p < 0.0001, sensitivity 100%, specificity 97%). Right-side pathways. If the QRS transition was between leads V2 and V3, the pathway was right septal; if after lead V4, it was right lateral. If it was between leads V3 and V4, then if the delta wave amplitude in lead II was > or = 1.0 mV, it was right septal; otherwise, it was right lateral (p < 0.0001, sensitivity 97%, specificity 95%). In right lateral locations, if the delta wave frontal axis was > or = 0 degrees, or if it was < 0 degrees but the R wave amplitude in lead III was > or = 0 mV, it was anterolateral; otherwise, it was posterolateral (p < 0.0001, sensitivity 100%, specificity 87.3%). Anteroseptal pathways had a sum of delta wave polarities in leads II, III and aVF > or = +2(p < 0.0001, sensitivity 100%, specificity 100%). Posteroseptal pathways
(inferior delta wave sum \( \leq -2 \)) were less well discriminated from right midseptal pathways (inferior delta wave sum \( \leq 1 \) or \( = -1 \)) \( p < 0.0001 \), sensitivity 76.5\%, specificity 71\%) \[corrected\]. Left-sided pathways. Two or more positive delta waves in the inferior leads or the presence of an S wave amplitude in lead aVL greater than the R wave, or both, discriminated left anterolateral pathways from posterior pathways \( p < 0.001 \), sensitivity and specificity 100\%). If the R wave in lead I was greater than the S wave by \( \geq 0.8 \) mV, and the sum of inferior delta wave polarities was negative, the location was posteroseptal; otherwise, it was posterolateral \( p < 0.05 \), sensitivity 71.4\%, specificity 100\%).

CONCLUSIONS. Using the algorithm derived, a right-sided accessory pathway can be reliably distinguished from one that is left-sided, right free wall from right septal, right anterolateral from posterolateral and anteroseptal from other right septal pathways. Left anterolateral pathways can be distinguished from left posterior pathways and left posterolateral pathways from left posteroseptal pathways.


Department of Cardiological Sciences, St. George's Hospital Medical School, London, United Kingdom.

A new algorithm (St. George's algorithm), based on the polarity and morphology of QRS complexes rather than delta waves, was developed for localizing accessory pathways to 1 of 9 sites on the atrioventricular annuli. This was compared with algorithms previously proposed by Skeberis et al
The preexcited 12-lead electrocardiograms recorded during sinus rhythm in 106 consecutive patients (including 60 retrospectively analyzed patients and 46 prospectively analyzed patients) who underwent successful radiofrequency catheter ablation of a single accessory pathway were analyzed by 3 blinded observers using all 3 algorithms. The results were compared with the actual localization of accessory pathways as derived from endocardial mapping during catheter ablation. In all 106 patients, the accuracy of the 3 algorithms for 4 sites on the atrioventricular annuli (as considered by Milstein's method) was 72%, 79%, and 92% for Milstein's, Skeberis', and St. George's algorithms, respectively. For 7 sites (as considered by Skeberis' method), the accuracy was 65% (Skeberis' algorithm) and 88% (St. George's algorithm), and for 9 sites (as considered by our method) the accuracy was 86% (St. George's algorithm). In 46 prospectively analyzed patients, the accuracy of the 3 algorithms for 4 sites was 70% (Milstein's), 67% (Skeberis'), and 87% (St. George's); for 7 sites the accuracy was 61% (Skeberis') and 85% (St. George's), and for 9 sites the accuracy was 85% (St. George's). The reproducibility of St. George's and Skeberis' methods was better than that of Milstein's method.

PMID: 8023781 [PubMed - indexed for MEDLINE]
characteristics and catheter ablation of parahissian accessory pathways. Circulation 1994 Sep;90(3):1124-8

Hospital Cardiologique du Haut-Leveque, Bordeaux-Pessac, France.

BACKGROUND: Accessory pathways may be located in close proximity to the His bundle, resulting in a high risk of heart block during attempted surgical or electrical interruption of these pathways. This study reports the prevalence, ECG characteristics, and results of catheter ablation of parahissian accessory pathways. They were defined on the basis of both the presence of a high amplitude (> 0.1 mV) of His bundle potential at the ablation site and an exclusion of anteroseptal or midseptal location of the accessory pathway. METHODS AND RESULTS: Eight patients with a parahissian accessory pathway were identified among 582 consecutive patients who underwent radiofrequency ablation of an accessory pathway. They were six males and two females with a mean age of 21 +/- 9 years. During maximal preexcitation, the ECG showed a positive delta wave in leads I, II, and a VF in all patients: six had a negative delta wave in leads V1 and V2 instead of the positivity usually observed in anteroseptal accessory pathways. This pattern had a sensitivity of 75%, a specificity of 96%, a positive predictive value of 86%, and a negative predictive value of 93% for a parahissian location in comparison with a group of 28 patients with anteroseptal accessory pathways. At the successful ablation site, the mean amplitude of the His bundle potential was 0.2 +/- 0.1 (0.12 to 0.4 mV). All accessory pathways were successfully ablated without causing heart block using 5 to 20 W of radiofrequency energy. CONCLUSIONS: Parahissian accessory pathways have a preexcitation pattern that is distinctive from that of anteroseptal accessory pathways. Catheter ablation of these
pathways is feasible using low energy with preservation of normal atrioventricular conduction.

PMID: 8087922 [PubMed - indexed for MEDLINE]

PMID: 8277067 [

Clinic of Internal Medicine II, University of Vienna, Austria.

Delta wave and QRS complex polarities have been extensively studied in preexcitation syndromes. However, only limited data exist about ventricular depolarization and repolarization in the setting of maximal preexcitation in relation to the site of insertion of the accessory pathway. Therefore this study was designed to systematically analyze cardiac depolarization and repolarization in patients with maximal preexcitation. We analyzed the polarity of the QRS complex and T wave on the frontal plane on the conventional 12-lead electrocardiogram in 118 patients with maximal preexcitation. Fast atrial pacing was used to provoke maximal ventricular preexcitation. The 32 patients with a left lateral accessory pathway showed right-axis deviation of the QRS complex (110 +/- 20 degrees) with a left-axis deviation of the T-wave axis (-40 +/- 25 degrees). The 54 patients with a posteroseptal accessory pathway had a left axis of the QRS complex (-50 +/- 20 degrees) with a right-axis deviation of the T-wave axis (95 +/- 15 degrees). The 11 patients with a right lateral accessory pathway had a left axis of the QRS complex (-40 +/- 20 degrees) and a right
axis of the T wave (110 +/- 10 degrees). In 7 patients with a left anterolateral accessory pathway and 14 patients with a right anteroseptal accessory pathway, the axis of the QRS complex was 50 +/- 25 degrees and 45 +/- 20 degrees, respectively. (ABSTRACT TRUNCATED AT 250 WORDS) PMID: 7942483 [PubMed - indexed for MEDLINE]


[Article in Spanish]

Departamento de Electrofisiologia, Instituto Nacional de Cardiologia Ignacio Chavez, Mexico, D.F.

From 250 consecutive patients who underwent radiofrequency ablation of accessory pathways, we studied 102 patients with successful ablation of a single overt accessory pathway. All patients had manifested preexcitation on a baseline 12 lead electrocardiogram. None of this patients had additional congenital or acquired cardiac abnormalities which could have affected the QRS morphology. A new algorithm for localizing the AP site was developed, based only on the polarity of the QRS complexes in DIII, V1 and V2, without analysis of the delta wave. We could localize the accessory pathway in five sites with 88% of probability of success. This simplify the electrocardiographic analysis of Wolff Parkinson White and improve the results of radiofrequency ablation.
OBJECTIVES. We investigated the usefulness of QRST values obtained from 12-lead electrocardiograms (ECGs) for identification of repolarization abnormalities before and after radiofrequency ablation in patients with Wolff-Parkinson-White syndrome. BACKGROUND. Marked T wave abnormalities often appear after ablation and have been attributed to a continuation of repolarization abnormalities present before ablation (cardiac memory). However, to our knowledge repolarization properties before and after ablation have not been assessed quantitatively. METHODS. We calculated the ECG QRST values from 53 patients with Wolff-Parkinson-White syndrome and compared these values before, immediately after and 1 day and 1 week after successful ablation in 25 patients. RESULTS. QRST values were abnormally high in lead V1 in 7 of 28 patients with a left-sided accessory pathway and abnormally low in leads III and aVF and high in lead aVL in 12, 9 and 10 of 20 patients, respectively, with a right-sided accessory pathway. Preexisting QRST abnormalities were still present immediately and 1 day after ablation but were usually absent by 1 week after ablation. QRST values before, immediately after and 1 day after ablation were not significantly different in
any lead. In 14 patients with ablation of a left-sided accessory pathway, QRST values before, immediately after and 1 day after ablation in lead V1 and immediately after ablation in leads I, aVR and V2 were significantly different from QRST values in those leads 1 week after ablation. In six patients with ablation of a right-sided accessory pathway, QRST values before, immediately after and 1 day after ablation in leads III, aVL and aVF and immediately after ablation in lead II were significantly different from QRST values in those leads 1 week after ablation. CONCLUSIONS. Electrocardiographic QRST values may provide useful quantitative information with respect to repolarization properties before and after ablation in patients with Wolff-Parkinson-White syndrome that is otherwise difficult to obtain by conventional ECG analysis. PMID: 7759709 [PubMed - indexed for MEDLINE]


Department of Medicine, Veterans General Hospital-Taipei, Taiwan, Republic of China.

Prediction of accessory pathway location before radio-frequency ablation has become increasingly important for patients with Wolff-Parkinson-White syndrome. However, existing electrocardiographic (ECG) criteria for localization of
Accessory pathways have several limitations, and the polarity of delta waves has not been well defined. In the present study, 369 patients with a single anterogradely conducting accessory pathway who underwent successful radiofrequency ablation were included. The polarity of delta waves was defined and categorized in detail, and various ECG characteristics of the most preexcited QRS complexes were examined and compared with QRS complexes after successful ablation in the initial 182 patients, which included morphology and polarity of delta waves, initial 20, 40, and 60 ms segments of the preexcited QRS complex, R/S ratio in the precordial leads, R/S ratio in the frontal leads, delta wave axis in the frontal plane, polarity of delta waves in the frontal leads, and polarity of delta waves in the precordial leads. The polarity of the initial 40 ms segment of the most preexcited QRS complexes in each of the frontal leads, and the polarity of the initial 60 ms segment of the most preexcited QRS complex in each of the precordial leads proved to be the best representatives of delta wave polarity in the respective leads. (ABSTRACT TRUNCATED AT 250 WORDS)

PMID: 7793401 [PubMed - indexed for MEDLINE]


Cardiovascular Center, O.L.V. Hospital, Aalst, Belgium.

BACKGROUND: Many criteria have been published to localize accessory pathways from the 12-lead ECG during
sinus rhythm. This study analyzed whether the localization of an accessory pathway could be predicted by using the polarity of the QRS complex during sinus rhythm on the surface ECG, instead of the delta wave polarity as used in many reports.

METHODS: The ECGs of 140 patients with an overt and single accessory pathway were evaluated. Eight localizations were taken into account. The precise location was previously known from successful radiofrequency ablation sites.

RESULTS: In 128 patients (92%), the new algorithm allowed an accurate diagnosis of the site of implantation of the accessory pathway. CONCLUSION: Analysis of the polarity of the QRS complex on five electrocardiographic leads provides an easy, fast and reliable way to localize accessory pathways during sinus rhythm.

PMID: 7491305 [PubMed - indexed for MEDLINE]

  [Article in Spanish]

Departmento de Cardiologia, Hospital General Universitario Gregorio Maranon, Facultad de Medicina, Universidad Complutense, Madrid.

BACKGROUND AND OBJECTIVES: Some electrocardiographic algorithms have been developed to predict the location of the accessory pathway in the WPW syndrome. Few studies address the interobserver variability of such algorithms and the possible observer-dependent changes of accuracy. This study analyzes three algorithms to
localize accessory pathways recently published, comparing the inter-observer variability, their predictive value and the most frequent problems observed during their application. METHODS: Ninety-six electrocardiograms from patients who underwent successful ablation of a single accessory pathway were reviewed. The location of each pathway was predicted by two independent observers according to three different reported electrocardiographic algorithms. The interobserver agreement, percentage of correct predictions and critical steps of each algorithm were analyzed. RESULTS: The interobserver agreement varied between 64 and 79% and the accuracy between 38 and 67%. The best results were obtained in the left lateral accessory pathways (69 to 89% correctly located). All the algorithms presented critical steps at which more than 20% of pathways were incorrectly classified. CONCLUSIONS: The analyzed algorithms present a high interobserver variability. The accuracy obtained is clearly lower than that reported by the corresponding authors. These facts should be considered when being used them in clinical settings.

PMID: 8756203 [PubMed - indexed for MEDLINE]


Electrophysiology Department, Instituto Nacional de Cardiologia Ignacio Chavez, Mexico DF.

A new algorithm is proposed for localization of accessory
atrioventricular pathways by use of a 12-lead electrocardiogram (ECG). The polarity of the QRS complex in leads III, V1, and V2 from 102 patients with Wolff-Parkinson-White syndrome with manifested preexcitation who underwent successful radiofrequency catheter ablation was analyzed. Accessory pathways on the right side of the heart were localized to three regions around the tricuspid annulus, and left-sided pathways were localized to two regions around the mitral valve annulus. In 42 of 46 patients (91%) with left posterolateral accessory pathways, a common characteristic of the ECG was a positive QRS complex in leads III and V1 (sensitivity 91%, specificity 95%). Of 19 patients with left inferior paraseptal or inferior accessory pathways, 16 (84%) had a negative QRS complex in lead III and a positive QRS complex in lead V1 (sensitivity 84%, specificity 98%). All six patients with right anterosuperior paraseptal accessory pathways had a positive QRS complex in lead III but a negative QRS complex in lead V1 (sensitivity 100%, specificity 97%). The 25 patients with right inferior paraseptal or inferior accessory pathways had a negative or isodiphasic QRS complex in leads III and V1, but the QRS complex was positive in lead V2 in 21 (84%) of these patients (sensitivity 84%, specificity 100%). Finally, five of the six patients (83%) with right anterior accessory pathways had a negative QRS complex in leads III, V1, and V2 (sensitivity 83%, specificity 96%). With the algorithm, the localization of accessory pathways was thus identified in 90 of the 102 patients (88%).

PMID: 8913903 [PubMed - indexed for MEDLINE]

Cardiovascular Center, Tsuchiura Kyodo Hospital, Tokyo, Japan.

The electrographic features of successful sites of radiofrequency catheter ablation were analyzed in 33 cases of posteroseptal accessory pathways and compared with those from 155 cases of free wall accessory pathways. The atrioventricular intervals in the posteroseptal cases were significantly longer than in the free wall cases (posteroseptal vs left and right free wall; 38 vs 33 and 26 msec, respectively; p < 0.05), and the incidences of continuous electrograms (42 vs 63 and 79%; p < 0.01) and PQS-pattern unipolar electrograms (50 vs 76 and 78%; p < 0.05) were significantly lower in the posteroseptal cases. The V-delta intervals in the posteroseptal cases were significantly longer than in the left free wall cases (17 vs 13 msec; p < 0.05), but shorter than in the right free wall cases (17 vs 23 msec; p < 0.05). No statistically significant difference in the incidence of Kent potentials among the 3 groups was observed. In radiofrequency ablation of posteroseptal pathways, the length of the atrioventricular interval and the incidences of continuous electrograms and PQS-pattern unipolar electrograms may be unsatisfactory even at the appropriate
target site, but the V-delta interval and Kent potential are good indicators of suitable target sites.

PMID: 9070959 [PubMed - indexed for MEDLINE]


Ankara University, School of Medicine, Cardiology Department, Turkey.

In this study, we tried to disclose certain electrocardiogram (ECG) criteria that might be useful in the classification of posteroseptal accessory atroventricular pathways as right and left in patients with pre-excitation in whom the accessory pathway localization was verified by subsequent successful ablation. Twenty such patients with posteroseptal accessory pathways (mean age 34.9 +/- 9.8; 11 male, 9 female) were included in the study. Localization of the accessory pathway was right posteroseptal in 13 (65%) and left posteroseptal in 7 (35%). Common to all these 20 patients with posteroseptal accessory pathways was a QRS polarity positive in lead L1 and negative in leads D3, aVL. In patients with right posteroseptal accessory pathways, QRS polarity was negative in lead V1 in all and positive in lead V2 in 90%. On the other hand, none of the patients with left posteroseptal accessory pathways showed negative QRS polarity in lead V1. In conclusion, these findings strongly suggest that in patients with pre-excitation, a QRS polarity negative in lead V1 and positive in lead V2 is an important surface ECG finding that signifies right-sided localization of a posteroseptal
accessory pathway. In cases with left posteroseptal accessory pathways, QRS polarity in leads V1 and V2 has been found to be either biphasic or positive.

PMID: 9197426 [PubMed - indexed for MEDLINE]


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INTRODUCTION: Delta wave morphology correlates with the site of ventricular insertion of accessory AV pathways. Because lesions due to radiofrequency (RF) current are small and well defined, it may allow precise localization of accessory pathways. The purpose of this study was to use RF catheter ablation to develop an ECG algorithm to predict accessory pathway location.

METHODS and RESULTS: An algorithm was developed by correlating a resting 12-lead ECG with the successful RF ablation site in 135 consecutive patients with a single, anterogradely conducting accessory pathway (Retrospective phase). This algorithm was subsequently tested prospectively in 121 consecutive patients...
(Prospective phase). The ECG findings included the initial 20 msec of the delta wave in leads I, II, aVF, and V1 [classified as positive (+), negative (-), or isoelectric (+/-)] and the ratio of R and S wave amplitudes in leads III and V1 (classified as R > or = S or R < S). When tested prospectively, the ECG algorithm accurately localized the accessory pathway to 1 of 10 sites around the tricuspid and mitral annuli or at subepicardial locations within the venous system of the heart. Overall sensitivity was 90% and specificity was 99%. The algorithm was particularly useful in correctly localizing anteroseptal (sensitivity 75%, specificity 99%), and mid-septal (sensitivity 100%, specificity 98%) accessory pathways as well as pathways requiring ablation from within ventricular venous branches or anomalies of the coronary sinus (sensitivity 100%, specificity 100%). CONCLUSION: A simple ECG algorithm identifies accessory pathway ablation site in Wolff-Parkinson-White syndrome. A truly negative delta wave in lead II predicts ablation within the coronary venous system.

PMID: 9475572 [PubMed - indexed for MEDLINE]


Service de Cardiologie, Hopital Central, Nancy, France.

INTRODUCTION: The purpose of this study was to evaluate the accuracy and limitations of published algorithms using the 12-lead ECG to localize AV accessory pathways (APs).
METHODS AND RESULTS: The 11 relevant algorithms found in the literature (MEDLINE database and major scientific sessions) were tested on a series of 266 consecutive patients who successfully underwent radiofrequency catheter ablation of a single overt AV AP. The positive predictive values (PPV) of the algorithms in applicable patients were significantly lower for algorithms with > 6 accessory location sites (40.6% +/- 10.9% vs 61.2% +/- 8.0%; P < 0.03) and show a tendency for algorithms not relying on delta wave polarity but on QRS polarity only (36.6% +/- 11.2% vs 52.3% +/- 13.1%; P = 0.09). The PPV in applicable patients is related to the AP location (P < 0.001) and ranked from the highest to the lowest as follows: left lateral (mean PPV = 86.3%), posteroseptal (mean PPV = 65.2%), right anteroseptal (mean PPV = 45.2%), and right posterolateral (mean PPV = 23.4%). CONCLUSION: Our study suggests that the accuracy of algorithms relying on the 12-lead ECG depends on AP locations as defined in the algorithms and on the number of AP sites. The accuracy tends to be lower when delta wave polarity is not included in the algorithm's architecture. This should be considered when using these algorithms or when building new ones. PMID: 10515558 [PubMed - indexed for MEDLINE]


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INTRODUCTIONS: Location of the accessory pathway (AP) in Wolff-Parkinson-White (WPW) syndrome can be determined accurately by the QRS polarity on resting ECG. These ECG characteristics may be different in children, and no algorithm has yet been tested. METHODS AND RESULTS: A total of 153 resting ECGs of symptomatic children with WPW syndrome were retrospectively analyzed. The anatomic AP location had been established fluoroscopically at eight possible sites during radiofrequency catheter ablation. Two independent observers predicted AP location on blinded ECGs with a QRS polarity algorithm for adults using leads II, III, aVL, V1, and V2. Subsequently, the QRS polarity for all individual ECG leads was evaluated and a new algorithm for children was devised. With the adult algorithm, the observers correctly predicted only 55% to 58% of AP locations. The septal and right-sided pathways often were inseparable, and mid-septal and parahisian pathways were missed. In the new children's algorithm, left lateral, left posteroseptal, and posteroseptal pathways shared a positive or intermediate QRS polarity on V1, with the left lateral pathway separated by a positive QRS polarity on lead III. Negative QRS polarity on lead V1 and positive QRS polarity on lead V3 were shared by right posteroseptal, mid-septal, parahisian, and anteroseptal pathways, with the latter two having a positive QRS polarity on lead aVF. Right lateral pathways had negative QRS polarity on lead V1 and negative or intermediate QRS polarity on lead V3. Overall accuracy for these five regions was 90%. CONCLUSION: AP characterization by QRS polarity in children with WPW syndrome is more diverse than in adults and requires other ECG leads to establish five AP regions.

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Non-invasive imaging of cardiac electrophysiology provides a non-invasive way of obtaining information about electrical excitation. An iterative algorithm based on a general regularisation scheme for non-linear, ill-posed problems in Hilbert scales was applied to the electrocardiographic inverse problem, imaging the ventricular surface activation time (AT) map. This method was applied to electrocardiographic data from a 31-year-old healthy volunteer and a 24-year-old patient suffering from a Wolff-Parkinson-White (WPW) syndrome. The objective was to evaluate non-invasive AT imaging of an autonomous sinus rhythm and to quantify the localization error of non-invasive AT imaging by localising the accessory pathway of the WPW syndrome and a pacing site for left ventricle pacing. The distances between the invasive and non-invasive localization of the pacing site and the accessory pathway were 8 mm and 5 mm. The clinical case presented, shows that this non-invasive AT imaging approach may enable the reconstruction of single focal events with sufficient accuracy for potential clinical application.

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