Angiographic dimensions of the triangle of Koch in patients with atrophic ventricular nodal re-entrant tachycardia

J.A. Cabrera, A. Medina, J. Sutez de Lezo, J. Segura, E. Hernández, A. Delgado, M. Pan, M. Romero, J. Ruiz Castroviejo, F. Wanguemat, J.R. Ortiga, Pino Hospital, University of Las Palmas, Reina Sofia Hospital, University of Córdoba, Spain

The anatomic boundaries of Koch's triangle (KT) are used as landmarks when attempting radiofrequency catheter ablation (RFCA) of slow pathway in AV nodal reentry. Simultaneous coronary artery and right atrial angiograms were performed in 45 patients (49 ± 5 years old) with AV nodal reentrant tachycardia (AVNRT) and 20 control subjects. In order to analyse the angiographic dimensions of KT and to determine the relationship of the AV nodal artery (AVNa) within KT. The angiographic margins of KT were defined in 45 degrees-RAO view by the tricuspid valve annulus (TVA) diameter, the minimal distance (BASE) between TVA and coronary sinus ostium (CSos) and the distance (CS-V) between the upper limits of the CSos and the TVA (V) (Figure). The table shows the KT dimensions in patients with AVNRT (mean ± SD and range, in millimeters).

Conclusions: Angiography is useful in defining KT boundaries and its variable size. This information could help in treating AV nodal reentry by radiofrequency catheter ablation.

ACCESSORY PATHWAYS

Incidence and clinical significance of Wolff-Parkinson-White pattern in 6 to 18 year-old school children in Iwate Prefecture, Japan

Naoki Chiba, Kenji Nakai, Kazuhiko Hotta, Yoshishito Hata, Katsuosuh Terui, Meichi Itoh, Katsuhiko Saito, Takao Konno, Katsuhiko Hiramori, Iwate Medical University, Morioka, Japan; Iwate Health Service Association, Morioka, Japan

Knowledge of the electrocardiographic Wolff-Parkinson-White pattern (WPW) has been derived from clinical studies. The purpose of this study is to review the incidence and clinical significance of WPW in unselected school children in Japan.

Method: We analyzed 163,110 ECG recorded in unselected school children from the Iwate Health Service Association registry in Japan between 1992 and 1994.

Results: While analyzing electrocardiograms recorded as a part of the annual school physical examination, 223 cases (0.14%) of WPW were discovered. Of these 223 cases of WPW, the mean age was 12.8 ± 2.9 yrs, including 101 (45.3%) males and 122 (54.7%) females. One patient had a ventricular septal defect. The accessory pathway (AP) was located in the left free wall in 111 cases (49.8%), posteroseptal in 55 cases (24.7%), anterior septal in 6 cases (2.7%) and right free wall in 42 cases (18.6%). Paroxysmal supraventricular tachycardia (PSVT) occurred in 26 cases (11.7%), paroxysmal atrial fibrillation in 2 cases (0.9%), and syncope in 6 cases (2.7%). The AP location was not related to PSVT. Sudden cardiac death (SCD) occurred in only 1 case during 3 years of follow-up. Though the patient had no history of palpitation or syncope, she experienced ventricular fibrillation during athletics.

In conclusion, the incidence and clinical significance of WPW in a local community-based population in Japan was similar to the values ascertained in previous clinical studies. The incidence of SCD in WPW is rare. Electrophysiologic studies and cather ablation should be carefully considered in asymptomatic WPW without associated heart disease.

Supraventricular tachycardia / Accessory pathways

Ventricular pre-excitation and sudden death

C. Basso, D. Corrado, A. Corrado, G. Thieme. Department of Pathology, University of Padua, Italy

Background: Previous reports of sudden death related to atrioventricular (AV) accessory pathways are anecdotal and often lack of autopsy validation. The aim of the study was to investigate site and the histologic characteristics of AV accessory pathways, as well as previous clinical history, in young sudden death victims with ECG evidence of ventricular preexcitation (VP), either in the setting of Wolf-Parkinson-White (WPW) with delta wave or Lown-Ganong-Levine (LGL) with short PR interval and normal QRS.

Methods and Results: Among 198 cases of juvenile (< 35 yrs) "arrhythmic" SD collected since 1979, we studied the hearts of 8 pts (4%) with an in vivo ECG diagnosis of VP, in which detailed autopsy study ruled out any other cardiac or extracardiac disease accounting for death. They were all males, age ranging 9-35 (mean 23.3 years). Five were entirely asymptomatic whereas 3 had palpitations. Sudden death occurred at rest in all (2 during sleep). Basal ECG showed WPW in 6, with delta wave polarity suggestive for left lateral VP in 3 and left posterior VP in 3, and LGL in 2. Sino-atrial and AV junctions as well as left lateral AV ring were always studied by serial histologic section technique. In case of WPW syndrome, histology of the left lateral ring showed AV accessory connections 0.2-0.5 mm thick, consisting of ordinary myocardium, located very close to the fibrous annulus, 0.5-1 mm far from the endocardium. In case of LGL syndrome, histology of the AV junction showed hypoplastic AV node in 1 and atrio-hisian fascicle located on the right side of the membranous septum in 1. Atrial myxoiditits was seen in one case. Conclusions: WPW and LGL syndromes accounted for 4% of "arrhythmic" SD in our large experience. A histologic substrate of VP was always documented. The trigger mechanism accounting for final cardiac arrest was rarely observed.

Characteristics of multiple versus single accessory pathways in 1078 patients undergoing catheter ablation attempts

Michael Schölter, Riccardo Cappotto, Joachim Hebe, Jürgen Siebels, Erica Braun, Karl-Heinz Kuck. St. Georg Hospital, Hamburg, Germany

Among 1078 pts (437 I, 639 m; 36 ± 17 years) who underwent attempts at RF ablation of an accessory pathway (AP) at our institution, a single AP was found in 1008 (SG group); 68 pts (6.3%, MU group) had multiple (associated) APs (61 ± 2 x 5 ± 3 x 1 x 4 x 5 APs). Ebstein's anomaly of the tricuspid valve was present in 11 MU group pts and 6 SG group pts; these patients all had right-sided APs. In 219 pts without Ebstein's anomaly, the percent distribution of APs along the left free wall (LFW), septum (Sept) and right free wall (RFW) was 44% (55/124 APs) versus 24% in the SG group (24/1002 APs), p < 0.001).

Among 1008 (SG group); 68 pts (6.3%, MU group) had multiple (associated) APs (61 ± 2 x 5 ± 3 x 1 x 4 x 5 APs) in 1076 pts (437 f, 639 m; 36 ± 17 years) who underwent attempts at RF ablation of an accessory pathway (AP) at our institution, a single AP was found in 1008 (SG group); 68 pts (6.3%, MU group) had multiple (associated) APs (61 ± 2 x 5 ± 3 x 1 x 4 x 5 APs). Success rates for ablation were 93% in MU pts (136/146 APs) and 96% (n.s.) in SG pts (314/327 APs). Concealed APs were significantly more frequent in the MU group (44% (55/124 APs) versus 24% in the SG group (24/1002 APs), p < 0.001).

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Anteroseptal, parahisian and midseptal accessory pathways: Radiofrequency ablation using a femoral approach

J. Brugada, R. Barreto, M. Figueiredo, M. Puigfelt, M. Matas, F. Navarro-Lopez. Arrhythmia Unit, Hospital Clinic, University of Barcelona, Spain

Radiofrequency ablation (RFA) of accessory pathways (AP) situated close to the anterointerceptive (AV) node—His bundle area can result in complete AV block and need of a permanent pace-maker. Most RFA techniques described for these AP are based in a yolcular approach. We present our data on RFA of the AP using a femoral approach.

Methods: From a total series of 460 AP, 16 (3%) were classified as anteroseptal (AS) because they were located superior to the His bundle area; 26 (6%) were classified as parahisian (PH) because before and/or after RFA, a His bundle potential was recorded at the successful ablation site, and 26 (6%) were classified as midseptal (MS) because they were located inferior to the His bundle and superior to the os of the coronary sinus. In all patients (pts) a 6F quadripolar catheter was positioned in the His bundle area and a 7F 4 mm tip steerable catheter was used for mapping and ablation.

Results: RFA was effective in eliminating conduction in 66 out of 68 AP. Total procedure time was 126 ± 67 min, Rx exposure time was 21 ± 17 min, mean temperature during the effective application was 53 ± 8°C, and mean power delivered was 33 ± 14 watts. Complete AV block requiring permanent pacing occurred in a single pt with a concealed PH AP. In 3 pts intermittent recurrence of antegrade AP conduction occurred during the first month of follow-up, but none of them presented with tachycardia after 27 ± 14 months follow-up, and no new ablation attempt was made. In AS AP the ablation site was reached during counterclockwise rotation of the ablation catheter from the His bundle area. In MS AP the ablation site was reached with downwards and clockwise rotation of the ablation catheter from the His bundle area, and in the PH AP the ablation site was reached with clockwise rotation of the ablation catheter into the ventricular aspect of the His bundle area.

Conclusions: RFA of anteroseptal, parahisian and midseptal accessory pathways can be effectively and safely performed using a femoral approach.

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Recurrence of atrial fibrillation in patients with Wolff–Parkinson–White after successful radiofrequency ablation of the accessory pathway


The mechanism underlying Atrial Fibrillation (AF) in the WPW Syndrome is uncertain: either electrophysiologic atrial abnormalities or the presence of a triggered retroconduction or a reentry in the branching network of the accessory pathway (AP) have been suggested. The incidence of recurrences after surgical, direct current or Radiofrequency (RF) Ablation (A) is controversial.

The clinical and electrophysiologic features and the long term follow-up of 57 WPW pts with no overt heart disease were reviewed (40 males and 17 females, age 27 ± 13): all of them had suffered from symptomatic documented episodes of AF (1-6 episodes, mean 2.5); 43 also from episodes of nonreciprocating tachycardias (AVRT).

They underwent RFA of the AP: the disappearance of antegrade and retrograde anomalous conduction was confirmed by a control electrophysiological study performed 30' after RFA and repeated subsequently if necessary.

APs were located as follows: 25 left lateral, 9 right posteroseptal, 6 left posterior, 5 left posterolateral, 4 left posterior, 3 right posterolateral, 3 right posterior, 2 right anteroseptal, 1 right anterior (3 ppt with 2 APs). Antegrade Refractory Period (ERP) of the AP was 241 ± 57.

The comparison of these data with those obtained from a control group of consecutive WPW pts without ARF showed no significant differences.

Three pts presented recurrences of AF. At a clinical follow-up of 23 ± 13 months: one is a 59 years old man with a lot of episodes of AF before RFA despite antarythmic treatment; another showed persistence of retrograde conduction, but none of the features previously described (age, number of episodes of AVRT and AF, site and ERP of the AP) differed significantly in the group owing to its small size.

Conclusions: RFA of the AP prevents recurrences of AF in the most (94%) of pts with WPW, previously documented AF and no overt heart disease. Therefore the integrity of the AP seems to be important in the induction or the maintenance of AF in these pts. Pts with WPW and lone paroxysmal AF must be considered for RFA regardless the ERP of the AP or the presence of AVRT.

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Variants of pre-excitation: Anterofascicular, nodofascicular, and fasciculoventricular accessory pathways


In contrast to the well-delineated clinico-pathologic correlation of accessory pathways (AP) in patients (pts) with Wolf-Parkinson-White syndrome, corresponding correlations for the variants of preexcitation syndromes and their role in preexcited tachycardias are controversial.

Twelve pts with variants of the preexcitation syndromes underwent electrophysiologic study and radiofrequency catheter ablation. The atrial origin of anterofascicular pathways (APF) remote from the normal AV node was assessed by application of late atrial extrastimuli that advanced the timing of the next QRS complex without antegrade penetration into the AV node. A nodofascicular pathway (NFP) was suggested if VA dissociation occurred during tachycardia and if atrial extrastimuli failed to reset the tachycardia without antegrade penetration into the AV node. A fasciculoventricular connection (FVP) was suggested if the proximal insertion of the AP was found to arise from the His bundle or bundle branches. Ten pts had evidence for APF and 1 pt each for a NFP and FVP. In 6 pts, the APF were successfully ablated, and in 2 pts, the retrograde fast AV node pathway. In 1 patient, a concealed right posteroseptal AP served as the retrograde limb and was successfully ablated. The NFP was shown to be a bystander during AV node reentrant tachycardia. After successful fast AV node pathway ablation resulting in marked PR prolongation, no preexcitation was present despite sinus rhythm because of the proximal insertion of the NFP distal to the delay producing parts of the AV node. The proximal insertion of the FVP was distal to the AV node at the AV bundle.

In conclusion, the majority of pts with variants of preexcitation present with specialized APF which originate from remnants of the specialized AV ring tissue. NFP and FVP exist and may give rise to preexcitation. In this study, both a FVP and a NFP acted as a bystander.

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Heart rate variability and baroreflex sensitivity decline differently with age. Implications for prognostic value after myocardial infarction

A. Mortara, M.T. La Rovere, J.T. Bigger Jr., F.I. Marcus, E. Colombo, G. Mazzuero, M.T. della Mea, S. Belletti, M.C. Ferrara, P.J. Schwartz, P.J. on behalf of the ATRAMI Investigators. Dept. of Cardiology, Fond. 'S. Maugeri', IRCCS, Montecasino and University of Pavia, Italy

Vagal activity declines with age. Until now this established concept has attracted modest interest. The evidence that markers of vagal tone (heart rate variability, HRV) and reflexes (baroreflex sensitivity, BRS) contribute to the post-myocardial infarction risk stratification has cast a new interest for the potential clinical relevance of the relation between age and vagal activity. We analyzed this relationship among 1284 patients enrolled in ATRAMI (Autonomic Tone and Reflexes After Myocardial Infarction). Available data for HRV (standard deviation of RR intervals in ms) and for BRS (ms/mmHg) were from 1170 and 1182 pts respectively. While both measures progressively decrease with age, vagal activity declines with age. Until now this established concept has attracted modest interest. The evidence that markers of vagal tone (heart rate variability, HRV) and reflexes (baroreflex sensitivity, BRS) contribute to the post-myocardial infarction risk stratification has cast a new interest for the potential clinical relevance of the relation between age and vagal activity. We analyzed this relationship among 1284 patients enrolled in ATRAMI (Autonomic Tone and Reflexes After Myocardial Infarction). Available data for HRV (standard deviation of RR intervals in ms) and for BRS (ms/mmHg) were from 1170 and 1182 pts respectively. While both measures progressively decrease with age, the decline is markedly steeper for BRS.