

Recording Complex Patient Data in the EP-Laboratory using Cross Reference Algorithm

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Abstract

Patients admitted for EP studies naturally compile complex data. Especially patients admitted for multiple arrhythmogenic substrates are challenging to record initially and follow up afterwards.

We have developed a software tool to record clinical data including pt.history, pretest diagnosis, basic EP values, invasive diagnostic as well as interventional data and patient clinical and invasive follow up with an intuitive entry algorithm. Data management is done online in local area network PC-environment.

Data input is done in a graphical user environment with automatic pulldown menus, choice algorithms and dialogue. Relevant choice lists comply with ACC/AHA guidelines.

Within 58 months of its full operation a total of 1072 EP sessions were performed on 780 patients. Within these sessions 768 arrhythmia substrates were found.

With 55pts (7%) no arrhythmogenic substrate was found; 682pts (87%) had single substrate, 39pts (5%) had double substrate; 4pts (0,5%) had multiple substrates. Among secondary substrates we found 14 [32%] AFib, 6 [14%] AVNRT, 5 [11%] AFlu, 15 [35%] mono AT, 4 [9%] VT)

The database is in clinical use demonstrating its advantages over conventional documentation techniques.

We believe that cross reference evaluation of clinical EP-data can only be managed using specially designed easy to use computer based software, which is well structured to avoid redundant data entry.

1. Introduction

Invasive electrophysiology studies [EPS] and interventions respectively compile a complex dataset describing this event. Especially patients admitted for multiple arrhythmogenic substrates are challenging to record initially and follow up afterwards.

We have developed a software tool that allows to record detailed clinical data with an intuitive entry algorithm. The data set includes patient history, pre-test

diagnosis, basic electrophysiology values, invasive diagnostic as well as interventional data. It can be linked to individual clinical follow-up including repeated admission to cardiac cathlab.

2. Methods

2.1. Software

The program is based on 4D, France 4th Dimension, a relational database system, being a multitasking, multisession client-server environment.

Data input is done in a graphical user environment with automatic pulldown menus, choice algorithms and dialogue. Relevant choice lists comply with ACC/AHA guidelines [1].

To allow intuitive entry of complex data from cardiac arrhythmia a special drag-& drop algorithm is applied.

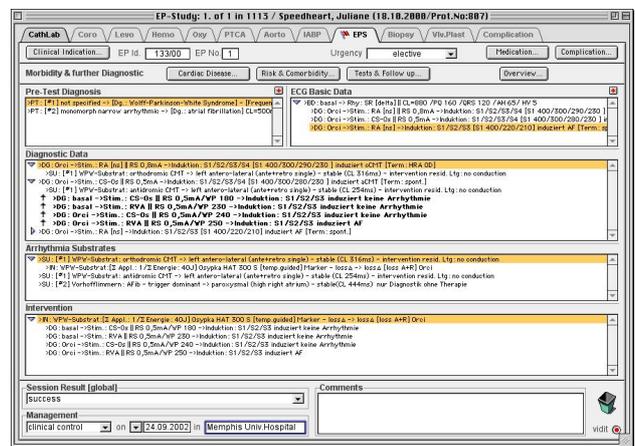


Figure 1. Entry layout of EP-Study

Specified arrhythmia substrates are described and handed over to detailed diagnostic or interventional procedures by dragging them step-by-step with the mouse key pressed. Thus the user may easily record the complete pathway of diagnostic or interventional protocol of multiple arrhythmia substrates within a single user

interface outlining the general procedural steps common to all EP sessions. Even post interventional intracardiac stimulation to evaluate the procedural success may be linked to another diagnostic step by just dragging the result back to diagnostic level. EP-Module will recognize the proper context.

2.2. Hardware

The program can be used in a multi platform environment and is now installed on IBM-PC and compatibles using Windows 98SE or Windows NT4x, Windows 2000 and XP operating system, as well as Apple Macintosh PC using MacOS 9.x and OS 10.x. The program design and network abilities require processor speed from 200Mhz upwards with at least 128Mb RAM.

3. Results

Within 58 months of its full operation a total of 1072 EP sessions were performed on 780 patients. Within these sessions 768 arrhythmia substrates were found.

With 55pts [7%] no arrhythmogenic substrate was found; 682pts [87%] had single substrate, 39pts [5%] had double substrate; 4pts (0,5%) had multiple substrates. Among secondary substrates we found 14 [32%] atrial fibrillation, 6 [14%] AV-nodal reentry tachycardia, 5 [11%] atrial flutter, 15 [35%] monomorphic atrial tachycardia, 4 [9%] ventricular tachycardia.

4. Discussion

These results constitute a representative model for complex queries arising in the cardiac EP-laboratory. Many clinical and numeric data are difficult to compile and compare due to their inherent inhomogeneity. The goal of our development was to outline the analogies of diagnostic and interventional EP sessions and find a comprehensive entry pattern. Along these analogies and the intuitive entry algorithm even an inexperienced user may record an invasive session and retrieve complex queries as shown above. The everyday acceptance by users will always be vital to any database project. Our clinical experience over years has shown that interface design remains crucial achieving this goal.

5. Conclusion and outlook

Our database is in clinical use now 66 months and has shown its superiority over paper records and the limited entry and query options of commercial EP workstations. It allows quick access to clinical data complementary to commercially available electrophysiology workstations. Interfaces to such workstations have just being finished in a next step to help synchronize numeric and image data respectively.

Additional acceptance by the users was provided with the installation of a wireless network client in the EP room. Invasive protocols and interventional reports support the administrative work of the EP team.

References

- [1] Zipes, et al, Clinical Intracardiac Electrophysiological and Catheter Ablation Procedures: ACC/AHA Practice Guidelines for Clinical Intracardiac Electrophysiological and Catheter Ablation Procedures (J Am Coll Cardiol 1995; 26: 555-73)

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