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# A new horizon for Brugada Syndrome: the challenge launched by the BruLoop Study

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Brugada Syndrome (BrS) presents a particularly challenging clinical field for cardiologists due to its associated potentially lethal and often unpredictable arrhythmic risk [1]. While secondary prevention in patients with documented ventricular arrhythmias is relatively straightforward, leading to the inevitable implantation of an implantable cardioverter-defibrillator (ICD), primary prevention is more debated. The challenge lies in effectively protecting the patient from sudden cardiac death (SCD) while avoiding overtreatment and potential complications from defibrillator implantation [2].

Currently, guidelines recommend ICD implantation in patients with BrS who have a history of arrhythmic syncope [3]. This raises significant concerns: is the definition of arrhythmic syncope, based on the patient's description of the event, reliable? Is the underlying arrhythmia ventricular in origin, or are they bradyarrhythmias or supraventricular tachyarrhythmias, which are also common in BrS patients? Could identifying these non-ventricular arrhythmias have clinical implications and play a role in the proper management of individual patients? How should we approach patients presenting with syncope of undetermined origin, given the high rate of neurally mediated events in this category?

Traditional diagnostic tools and intermittent monitoring often fail to detect the sporadic but dangerous arrhythmic events characteristic of this condition, thus failing to provide a comprehensive picture of the individual patient. In this context, the use of continuous monitoring devices such as implantable loop recorders (ILRs), currently recommended as Class IIa with level of evidence C in subjects with BrS and syncope of undetermined origin, may be advantageous [3].

The BruLoop study has recently illuminated the potential of these devices in both the diagnosis and management of this condition [4]. The study aims to refine the diagnostic assessment of symptoms, particularly syncope, to better understand the arrhythmic and non-arrhythmic nature of these events and to detect silent but dangerous arrhythmic events, thus optimizing the indication for ICD implantation. Additionally, this study provided insights into the clinical implications and various therapeutic decisions (such as the implantation of pacemakers, drug therapy, or ablation of arrhythmic circuits) that may arise from the recording of ventricular and non-ventricular arrhythmic events.

### *Advanced Arrhythmia Detection*

The increased detection of arrhythmic events is among the most compelling results of the BruLoop study. ILRs enable the identification of both symptomatic and asymptomatic arrhythmias due to their continuous and long-term monitoring capabilities. This is particularly important for patients with BrS, as silent arrhythmias can develop into potentially fatal episodes. ILRs can recognize these hidden threats and allow early interventions to reduce the risk of SCD.

In this study, arrhythmic events were recorded in 25.4% of patients, primarily represented by atrial arrhythmias (AAs) (16%), followed by bradyarrhythmias (BAs) (8%), and finally, the less frequent but still significant ventricular arrhythmias (VAs) (5%). These events occurred more frequently in individuals with symptoms before ILR implantation: notably, palpitations were associated with a higher rate of atrial and ventricular tachyarrhythmias compared to syncope, which was predominantly associated with bradyarrhythmic episodes. Conversely, asymptomatic individuals did not exhibit VAs.

Arrhythmic syncope occurred in approximately 9% of patients, with over half of these cases caused by BAs, confirming them as the main culprit of those syncopes that often lead to ICD implantation, as recommended by European guidelines. This raises questions about the appropriateness of such therapeutic interventions in this patient setting.

Another interesting finding pertains to patients currently indicated for ILR implantation, namely those with syncope of undetermined origin. In this group, BAs and AAs were more prevalent than those of ventricular origin; this supports the appropriateness of continuous monitoring in these individuals, allowing for optimal and individualized patient management.

### *Predictors of Arrhythmias in BrS Patients*

The continuous data flow from ILRs also allowed a comparison between what have been considered the major arrhythmic predictors and the actual event detection during long-term monitoring. The BruLoop study data revealed that the only predictor of VAs was the induction of ventricular fibrillation during an electrophysiological study, whose role in this syndrome is highly debated and should always be considered with the type of ventricular stimulation protocol adopted and the overall risk of the individual patient in mind.

Moreover, the symptom status before ILR implantation proved to be an independent predictor of overall arrhythmias, a somewhat predictable finding that, when analyzed in detail, leaves room for interesting reflections. The study included patients symptomatic for palpitations or syncope, and these two classes of patients showed two very different trends: as previously discussed, the palpitations group was associated with a high rate of AAs and a higher rate of VAs compared to the syncope group, where bradyarrhythmic events predominated. This data raises two spontaneous questions: does it make sense to limit ILR implantation to patients with syncope of undetermined origin and not to those symptomatic for palpitations, given the high incidence of atrial arrhythmias in the latter and the fundamental clinical implications that can result from this finding? Does it make sense to continue basing ICD implantation on the description of an arrhythmic syncope, often based on the patient's memory and ability to describe the event, especially in light of the more frequent bradyarrhythmic causes of the symptom and the high incidence of vasovagal forms in this population?

### *Optimization of Treatment Strategies*

Another significant contribution of the BruLoop study is the substantial impact of continuous monitoring devices on optimizing therapeutic strategies. The real-time data provided by ILRs allow physicians to continuously assess the effectiveness of therapeutic interventions and introduce new ones, overall improving patient management. For example, the study highlighted how the recording of arrhythmic events led to clinical implications and therapeutic decisions in 18.4% of patients, particularly in the group of patients who were symptomatic before ILR implantation. Additionally, these decisions not only involved ICD implantation (6.2%) but also pacemaker implantation (2.2%), introduction of medications such as antiarrhythmics and anticoagulants (9%), and tcatheter ablations of AAs and VAs (10.4%).

By providing concrete evidence of arrhythmic events, ILRs help justify the necessity of such interventions, ensuring that patients receive the most appropriate and potentially life-saving treatments.

## Conclusion

The BruLoop study provides an interesting point of reflection on a potential tool at our disposal for better managing patients with Brugada Syndrome. Continuous monitoring devices not only allow for timely detection of arrhythmic episodes and improved risk stratification but also enable active intervention by personalizing therapies, tailoring treatment to the patient to minimize the over-treatment often accompanying this condition.

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