

# This Week's Citation Classic

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**Guiraudon G, Fontaine G, Frank R, Escande G, Etievent P & Cabrol C.** Encircling endocardial ventriculotomy: a new surgical treatment for life-threatening ventricular tachycardias resistant to medical treatment following myocardial infarction.

*Ann. Thorac. Surg.* 26:438-44, 1978.

[Service de Chirurgie Cardio-Vasculaire du Professeur Cabral, and the Service de Cardiologie du Professeur Grosgeat, Group Hospitalier Pite-Salpetriere, Paris, France]

The paper described a comprehensive, direct surgical technique for ablation of ventricular tachycardias after myocardial infarction. A circular endocardial ventriculotomy modifies and isolates the arrhythmogenic tissue. [The SC<sup>®</sup> indicates that this paper has been cited in more than 235 publications, making it the most-cited article published in this journal.]

## The Circle of the Heart

**Gerard Guiraudon**  
Cardiovascular and Thoracic Surgery  
University Hospital  
339 Windermere Road  
London, Ontario N6A 5A5  
Canada

The paper was more a trigger than a landmark in the development of surgery for ventricular arrhythmias after myocardial infarction. An impressive body of knowledge had been accumulated in the preceding decades by brilliant, innovative scientists and clinicians, but the surgical application needed a passionate "connoisseur" who enjoyed the music, believed the lyrics, and dared to put the libretto into play.

I shared a long-standing interest in cardiac arrhythmia, with Guy Fontaine. During the late 1960s, we developed cardiac mapping in the laboratory and successfully applied the technique on a few patients with the Wolff-Parkinson-White syndrome<sup>1</sup> and ventricular tachycardia in the absence of coronary artery disease.<sup>2</sup> Our early experience using cardiac mapping was disappointing in patients with ventricular tachycardia after myocardial infarction, but it led to the design of the encircling endocardial ventriculotomy based on three criteria: (1) the concept of exclusion of the arrhythmogenic border zone to confine abnormal impulses within the scar; (2) the endocardial fibrosis, used as a guide to the endocardial ventriculotomy; and, (3) avoidance of intraoperative mapping.

The paper established the concept of direct surgery, addressing the arrhythmogenic myocardium specifically. Exclusion was applied to other cardiac arrhythmias—atrial arrhythmia (left

atrial isolation), ventricular arrhythmias (right ventricular free wall disconnection), etc.<sup>3</sup> Endocardial fibrosis was documented as a reliable landmark and the site of arrhythmogenicity. Soon after, Mark Josephson and Alden Harken described the map-guided subendocardial resection—now widely used. Intraoperative mapping has been controversial ever since.

The paper and the technique owe a lot to frustration and friendship. When the first patient came around, I was in a depressed slump. I could not convince anyone that surgery for ischemic ventricular arrhythmia had a future—even Guy, my electrophysiology (EP) partner. Fortunately, the first patient came on a holiday (November 12, 1975) when I was on call. He was the worst (or the best) to start with. A 48-year-old man, with incessant ventricular tachycardia and low output cardiac failure poorly controlled by intraaortic balloon pump. He was a success. I waited 10 months to operate on a second patient because the first "accidental" success had convinced nobody. The second patient was admitted and discharged three times from the CVT service before a successful operation. It took three years to collect five patients. I was pleased when I heard that Mark and Alden could select and operate on 12 patients just a few months after my presentation.

The paper never would have been published in the English literature without the help of Larry Laughlin, a cardiac surgeon at Loma Linda Adventist Hospital. I was visiting him during our summer holidays in July 1977, and I gave a short presentation in broken English. Larry encouraged me to write an abstract to the Society of Thoracic Surgeons. He was my master in American English, and we spent a long evening translating "la ventriculotomie circulaire d'exclusion" into "the encircling endocardial ventriculotomy."

The paper has been quoted both because of its historical value and, foremost, for critique because of potential shortcomings of the technique. Since then, the surgery for ventricular arrhythmia has continued to develop, based on the same rationale.<sup>5</sup> Over this period, I enjoyed a productive and competitive friendship with the electrifying EP "circle."

1. Fontaine G, Guiraudon G, Bonnet M, et al. Section d'un faisceau de Kent dans un cas de syndrome de Wolff-Parkinson-White, de type A-B. Cartographies epicardiques. *Arch. Mai. Coeur Vaiss.* 65:925-34, 1972.

2. Guiraudon G, Frank R & Fontaine G. Interet des cartographies dans le traitement chirurgical des tachycardies ventriculaires rebelles recidivantes. *Nouv. Presse Med.* 3:321, 1974.

3. Guiraudon G M, Klein G J, Gulamhusein S S, et al Total disconnection of the right ventricular free wall: surgical treatment of right ventricular tachycardia associated with right ventricular dysplasia. *Circulation* 67:463-70, 1983.

4. Harken A H, Josephson M E & Horwitz L N. Surgical endocardial resection for the treatment of malignant ventricular tachycardia. *Ann. Surg.* 190:456-60, 1979. (Cited 85 times.)

5. Ostermeyer J, Kirklin J K, Borggreffe M, et al. Ten years electrophysiology guided direct operations for malignant ischemic ventricular tachycardia: results. *Thorac. Cardiovasc. Surg.* 37:20, 1989.

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