Pharmacologic Blockade of the Left Stellate Ganglion Using a Drug-Reservoir-Pump System

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Patients suffering from the long QT syndrome (LQTS) are threatened by sudden arrhythmic cardiac death. This case report describes a new therapeutic approach to ventricular tachyarrhythmias refractory to oral pharmacological treatment (propranolol + phenytoin) using a drug-reservoir-pump system for the pharmacologic blockade of the left stellate ganglion.

Patients suffering from the long QT syndrome (LQTS) are threatened by sudden arrhythmic cardiac death. This hereditary disease is characterized by prolongation of QTc interval ≥ 440 ms and stress-induced syncope. Minor characteristics are: congenital deafness, alternating T wave, bradyarrhythmia in children, and repolarization disturbances.1

The observation of stress-induced syncope suggests that increased sympathetic activity in patients with LQTS may play an important role for the initiation of cardiac tachyarrhythmias. Experimental studies have shown that an imbalance of sympathetic cardiac innervation with predominance of the left stellate ganglion results in QTc prolongation and ventricular tachyarrhythmias.2 This was the rationale to use β-blocking agents as the therapy of choice (ie, propranolol 2 to 4 mg/kg of body weight daily). If this drug has not proven to be effective in suppressing ventricular tachyarrhythmias, propranolol may be combined with phenytoin (2.0 to 2.5 mg/kg of body weight daily).4 Administration of this medication led to a decrease of mortality in LQTS patients from well over 70 percent to approximately 7 percent over a five-year period. Nevertheless, medical therapy (propranolol + phenytoin) may fail in some cases.3 Therefore, operative left ganglion stellectomy was introduced as a new therapeutic approach to patients who suffer from syncope despite oral medication. However, controversial results on the effects of left ganglion stellectomy were reported.1,5 Following left ganglion stellectomy, bradycardia and Horner's syndrome were observed. Despite surgery, some patients continued to have recurrent tachyarrhythmic episodes and syncope.1,5 Electrical therapeutic approaches are of limited value, because either they are ineffective (ventricular overdrive stimulation) or they are not widely available (automatic implantable cardioverter-defibrillator).6 We therefore introduced a new therapeutic approach to patients with LQTS with tachyarrhythmias refractory to oral medical therapy.

CASE REPORT

A 29-year-old woman with LQTS suffered from five syncope due to ventricular tachyarrhythmias despite treatment with 320 mg propranolol and 200 mg phenytoin daily. An operative left ganglion stellectomy was planned, but she refused surgery. Therefore we performed a transcutaneous pharmacologic blockade of the left stellate ganglion.
stellate ganglion using 4 ml/mepivacaine 2 percent. After this procedure by continuing oral medication, no further cardiac rhythm disturbances appeared for four weeks. This encouraging observation led us to the decision to implant a drug-reservoir-pump system (SECOR, Cordis Corp. Fig. 1) for continuous pharmacologic blockade of the left stellate ganglion, which was accepted by the patient by her written consent to this procedure.

After local anesthesia, the drug-reservoir pump was implanted subcutaneously in the left upper abdominal quadrant. A special catheter was connected, subcutaneously directed to the left neck and after local incision placed directly into the region of the left stellate ganglion. The drug-reservoir contains 12 ml of a local anesthetic, and the pump-device delivers 0.1 ml per single dose, delivered mechanically by the patient. After release of 100 doses the reservoir can easily be refilled transcutaneously using a 25-gauge needle under sterile conditions. The reservoir was filled with mepivacaine 2 percent and the patient administered two doses of 0.1 ml mepivacaine daily in addition to oral medication. Since implantation of the reservoir-pump system in May 1987 until December 1988, the patient revealed stable sinus rhythm, and ventricular tachyarrhythmic episodes or syncopes did not occur anymore. In addition there was no evidence of Horner's syndrome or bradycardia.

CONCLUSION

This encouraging result suggests that pharmacologic blockade of the left stellate ganglion, using a permanent drug reservoir-pump-system complementary to oral medication (propranolol + phenytoin), may be effective in patients with LQTS, who suffer from syncopes despite adequate oral drug therapy.

REFERENCES

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Iatrogenic Internal Mammary Artery to Coronary Vein Fistula*

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Iatrogenic aortocoronary vein fistula following coronary artery bypass surgery is a rare complication. We describe the first reported case of inadvertent anastomosis of the left internal mammary artery to cardiac vein. The clinical characteristics and consequences as well as the angio-

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Figure 1. Right anterior oblique arteriogram of LIMA to great cardiac vein fistula demonstrating dilated coronary sinus (arrow).

Graphic characteristics of this fistula are described. Precautions that may be taken to prevent this complication are also addressed. (Chest 1990; 97:251-52)

Iatrogenic aortocoronary vein fistula after coronary artery bypass graft surgery is an unusual complication. With the use of cardioplegia during coronary artery bypass surgery, a sclerotic great cardiac vein in an area of epicardial fat or adjacent to an intramyocardial portion of the left anterior descending coronary artery (LAD) can easily be confused for the target vessel (Fig 1). Nearly all reported cases of iatrogenic aortocoronary vein fistulas resulted from the accidental anastomosis of a saphenous vein bypass graft to a coronary vein, most frequently the great cardiac vein. This patient is the first described with an inadvertent anastomosis of the left internal mammary artery (LIMA) to the great cardiac vein.

Figure 2. Left anterior oblique arteriogram of LIMA to great cardiac vein fistula showing high grade stenosis at anastomotic site and dilated coronary sinus (arrow).