

# Transmyocardial Laser Revascularization

TMR is a new procedure used to treat inoperable heart disease in people with persistent angina that isn't relieved by any other method.

Most people with coronary artery disease are treated with angioplasty and stenting or, coronary bypass surgery and medications to improve blood flow to the heart muscle. If these procedures do not eliminate the symptoms of chest pain (also called angina), other treatment options are available.

TMR, or transmyocardial laser revascularization, is a newer treatment aimed at improving blood flow to areas of the heart that were not treated by angioplasty or surgery. A special carbon dioxide (CO<sub>2</sub>) laser is used to create small channels in the heart muscle, improving blood flow to the heart muscle.

## How Does TMR Work?

TMR is a surgical procedure. It is performed through a small incision in the left side of the chest. Frequently, it is performed along with coronary bypass surgery, occasionally alone.

Once the incision is made, the surgeon exposes the heart muscle. A laser hand piece is then positioned on the area of the heart to be treated. A special high-energy, computerized CO<sub>2</sub> laser is used to create between 20 to 40 one-millimeter-wide channels (about the width of the head of a pin) in the left ventricle (left lower pumping chamber) of the heart. The doctor determines how many channels to create during the procedure. The outer areas of the channels close, but the inside of the channels remain open inside the heart to improve blood flow.

The CO<sub>2</sub> Heart Laser uses a computer to direct laser beams to the appropriate area of the heart in between heartbeats, when the ventricle is filled with blood and the heart is relatively still. This helps to prevent electrical disturbances (arrhythmias) in the heart.

Doctors aren't sure how TMR improves blood flow to the heart. Clinical evidence suggests blood flow is improved and the procedure may promote angiogenesis, or the growth of new capillaries (small blood vessels) that help supply blood to the heart muscle.

TMR usually takes one to two hours. The procedure may last longer if it is combined with other heart procedures.

## Who Is a Candidate For TMR?

TMR is a treatment option for individuals who:

- Have severe angina, which limits their daily activities or causes them to wake from pain at night, despite medications.
- Have pre-operative tests that show ischemia (decreased blood supply to the heart muscle).
- Have a history of previous bypass surgery or angioplasty, and no further intervention is available.
- Have been told by their doctor that there is nothing that can be further done to help their symptoms.

TMR has shown positive clinical benefits for patients who may require one or two bypass grafts, yet also have other areas of the heart that are not able to be bypassed with direct bypass-surgery. This is often seen in patients with diabetes. The surgeon will bypass the targeted blockages and use the CO<sub>2</sub> Heart Laser on the heart muscle with diffuse disease to achieve more complete blood flow to the heart.

TMR is not suitable for patients whose:

- Heart muscle is severely damaged due to heart attacks; the heart muscle is dead or scarred rather than affected by inadequate blood supply (ischemic).
- Heart muscle has no areas of ischemia (inadequate blood supply).

## What Types of Tests Will I Need to Determine If I Am a Candidate?

Your doctor will first evaluate your medical condition and review your medical history. Tests required before TMR may include:

- Cardiac catheterization, to visualize your coronary arteries and see if any blockages are present.
- Other tests to determine blood flow to your heart muscle and the pumping ability of your heart, such as:
  - Echocardiogram
  - PET (Positron Emission Tomography) study (a newer test that can evaluate the function of the heart.)
  - Dobutamine Echocardiography
  - Cardiac MRI

After reviewing your medical condition and history, along with your test results, your doctor will decide if you are a candidate for the TMR procedure. If you are eligible, the doctor will discuss the benefits and risks.

### **Does TMR Work?**

In a study - published by *The New England Journal of Medicine* (1999), 72% of patients who had TMR experienced an improvement in angina symptoms after 12 months, compared to only 13% patients who were receiving medications for the treatment of their angina symptoms. The study concluded that TMR patients had:

- Relief of chest pain.
- Improved quality of life.
- Improved blood flow to the heart.
- Decreased hospital admissions.

Research is currently underway to evaluate TMR patients for symptom relief and long-term outcomes.

### **Is TMR Covered by Insurance?**

TMR is covered by most insurance companies. Ask your insurance company if you have coverage for this procedure.

### **How Long Is the Hospital Stay?**

The hospital stay is about four to seven days. The length of stay depends on your overall health and rate of recovery. Your doctor and surgeon will evaluate you after the surgery and determine when you should return home.

### **Will I Have Improved Health After TMR?**

After TMR, some patients feel immediate relief from angina symptoms, while in others it may take 3 or more months to feel improvement. Some patients do not have improved symptoms after TMR, but may have improved activity tolerance. After TMR, you may still be required to take medications to help your heart and improve blood flow to the heart. You will need to meet with a cardiologist for frequent follow-up visits so your progress after TMR can be evaluated.

### **How Active Can I be After TMR?**

Your doctor will discuss specific activity guidelines that are appropriate for you after your procedure. A supervised cardiac rehabilitation program is recommended to help guide your recovery and help you progress your activity level.