[OPERATING ROOM SOUNDS]

DENNIS DOUDA: Mayo Clinic orthopedic surgeon, Dr. Rafael Sierra, is glad he can help this patient walk again by replacing her badly damaged hip joint, but he'd rather help patients avoid such surgery entirely. She's only 19 years old. Harsh rounds of chemotherapy helped her beat cancer, but caused a condition called osteonecrosis.

DR. RAFAEL SIERRA: Essentially the death of the bone.

DENNIS DOUDA: It can happen in knee, ankle, or shoulder joints, but most commonly occurs in the hip, at the top of the femur or thigh bone. 80% to 95% of patients eventually need artificial joint replacement. However, injections of stem cells have healed the hips of some of Dr. Sierra's patients with a minimally invasive 45-minute outpatient procedure that poses very little risk. First, two small cuts are made at the top of the hip bones.

DR. RAFAEL SIERRA: harvest the bone marrow from the iliac crest from patients. And it's currently put into a centrifuge where we spin down the cells.

DENNIS DOUDA: The stem cells are then mixed with platelet rich plasma from the patient's own blood. Next, the doctor does a hip decompression, the standard procedure of opening the diseased bone at the top of the femur to release pressure and allow new bone to grow.

DR. RAFAEL SIERRA: Now it allows us through a special instrumentation system that we've actually designed here, is to inject these cells into the area of the necrosis.

DENNIS DOUDA: Director of the Mayo Clinic Center for Regenerative Medicine, Dr. Andre Terzic, says this is just one tantalizing example of how helping the body heal itself can lead to actual cures.

DR. ANDRE TERZIC: In other words, we have been able to go after the symptoms of disease. Increasingly with the advances in technology, we'll be able to go after the root cause of the problem.

DENNIS DOUDA: Dr. Sierra says for most of his patients stem cell therapy means they're hip replacement can wait. Hopefully, indefinitely.

DR. RAFAEL SIERRA: In 80% of the patients, we have been able to halt the progression at least between two and five years.

DENNIS DOUDA: For the Mayo Clinic News network, I'm Dennis Douda.