Image of the Month

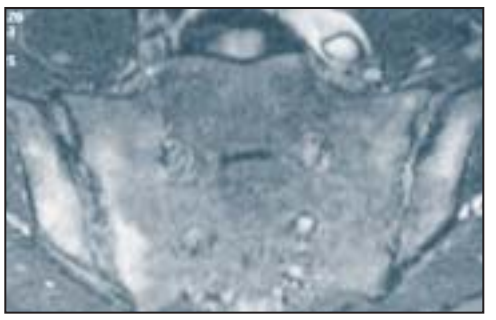
Magnetic resonance imaging detects inflammation in the sacroiliac joints in affected patients early in the course of ankylosing spondylitis when no chronic changes are detectable on radiograph, said Prof. Jürgen Braun, medical director of Rheumazentrum Ruhrgebiet, Ruhr-Universität Bochum, Herne (Germany).

The spinal stiffness and loss of spinal mobility that are often the presenting symptoms of ankylosing spondylitis result from spinal inflammation and/or structural damage that is in turn triggered primarily by osteoproliferation rather than osteodestruction. Inflammation is assumed to trigger new bone formation. However, no close correlation between inflammation and osteoproliferation has been found so far.

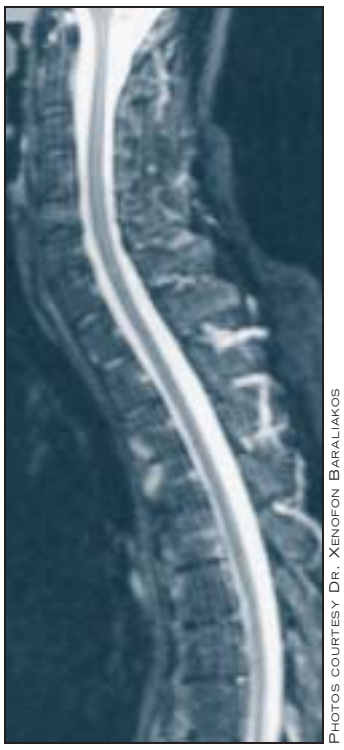
Sacroiliitis is a hallmark of the disease, especially in early stages. However, radiographs of the sacroiliac joints can appear normal in the early phase of the disease, meaning that structural changes might not be apparent for several years. The inability of radiographs to detect chronic changes can lead to diagnostic delay in ankylosing spondylitis. MRI has proved to be useful in the detection of axial inflammation in very early stages of the disease, commented Dr. Braun.

Used with an imaging technique called short tau inversion recovery (STIR) that does not require contrast agents, MRI also can identify sacroiliitis and spondylitis in patients with other spondyloarthritides including the undifferentiated form that progresses into ankylosing spondylitis in more than 50% of the cases. In one study, MRI of sacroiliac joints was able to predict the development of structural radiographic changes in these joints with a positive predictive value of 60%, 3 years before the changes occurred (J. Rheumatol. 1999;26:1953-8).

While the use of MRI to detect chronic changes continues to be under investigation, radiographs offer a more sensitive way to detect existing structural changes. "Therefore, a radiograph of the sacroiliac joints is always needed, especially at early disease stages," he said, noting that 20%-30% of patients will already have developed structural changes within the first 2 years of inflammatory back pain.



Inflammatory lesions of the sacroiliac joint are seen with STIR technique MRI.



Photos courtesy Dr. Xenofon Baraliakos

Inflammatory lesions can also be seen in the spine using STIR technique MRI.

MRI also appears to be useful for the detection of enthesitis and synovitis, not only in the axial skeleton but also in the peripheral joints and entheses.

Several medications have been available for the treatment of ankylosing spondylitis, with varying degrees of efficacy. But the introduction of the tumor necrosis factor (TNF) blockers has been a substantial development for patients with the disease. Earlier diagnosis could translate into earlier use of these effective medications and preservation of joint architecture.

Three agents are currently approved for ankylosing spondylitis: the monoclonal chimeric antibody infliximab (Remicade), the fully humanized monoclonal adalimumab (Humira), and the recombinant human soluble TNF-α receptor fusion protein etanercept (Enbrel).

MRI may have a role in assessing response to therapy. "Clinical disease activity and spinal inflammation as detected by MRI are substantially reduced by TNF blockers, as shown after short-term and long-term anti-TNF therapy," said Dr. Braun. On the basis of two recent studies it appears unlikely that the treatment with TNF blockers is able to completely halt radiographic progression. However, recent long-term data on anti–TNF-α therapy in ankylosing spondylitis suggested that function and mobility of the patients who were consistently treated over 5 years is preserved in an improved state, compared with baseline.

—Kerri Wachter

Ask the Expert

Device Offers Jolt of Relief for Knee OA Pain

For patients with knee osteoarthritis in whom treatment with analgesics and nonsteroidal anti-inflammatory drugs are insufficient or intolerable, pulsed electrostimulation is a safe, effective, noninvasive option for reducing pain and improving function, and it may even reduce the need for total knee arthroplasty, according to Dr. Douglas Garland, the director of the division of neurotrauma at the Rancho Los Amigos Medical Center in Downey, Calif.

DOUGLAS GARLAND, M.D.

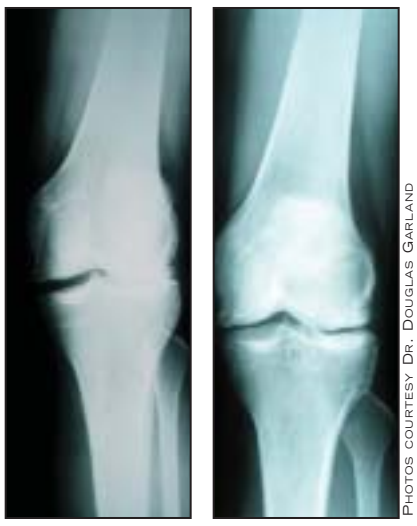
In a randomized, double-blind placebo-controlled trial, Dr. Garland and colleagues evaluated the safety and efficacy of a capacitively coupled, pulsed electrical stimulation (PES) device in 58 outpatients with moderate to severe osteoarthritis of the knee. Study participants were directed to use the active treatment device—a wrap-around knee garment with flexible, embedded electrodes that deliver small electrical currents of 0- to 12-volt output to the affected area—or the placebo device at home for 6-14 hours per day. After 3 months, the active treatment group had greater improvement than controls in a patient global evaluation, patient report of knee pain, and the Western Ontario and McMaster Universities questionnaire. The treatment group had 51% greater improvement in patient global scores, 31% in patient pain, 25% in WOMAC stiffness, 30% in WOMAC function, 20% in WOMAC pain, and 27% in total WOMAC scores. Additionally, substantially more patients in the treatment group had improvement by more than 50% on all measures (Osteoarthritis Cartilage 2007;15:630-7). Dr. Garland was the lead investigator for this study, which was funded by BioniCare Medical Technologies Inc., maker of the device.

Although the precise mechanism by which pulse electrostimulation acts on the human knee is unknown, "three decades of in vitro and animal research provide compelling evidence for a positive local effect on chondrocyte function through gene regulation," the authors wrote. In this month's column, Dr. Garland discusses the clinical application and promise of pulsed electrostimulation.

Rheumatology News: What are some hypotheses for the improvements associated with PES treatment?

Dr. Garland: There are at least three mechanisms that can be observed clinically when one uses PES. First, in some patients, there is a dramatic reduction in their pain within 1 month after treatment is initiated. This could be the result of a reduction of cartilage degradative enzymes such as interleukin-1 and matrix metalloproteinases and consequent decrease in the inflammatory response, a blockage of the inflammatory response itself, or both. Second, in some patients, radiographs demonstrate an increase in joint space at 3 months. This is most likely secondary to the PES influencing or mimicking the negatively charged aggrecan molecule and attracting positive counter ions, such as sodium. The net effect will be swelling of the articular space and an increase in joint space radiographically. Finally, some patients have late, long-term radiographic increases in their joint space.

We have demonstrated new cartilage by biopsy in one of these patients. This is most likely the result of stimulation of the chondrocytes leading to the upregulation of cell proliferation and matrix synthesis.



Photos courtesy Dr. Douglas Garland

OA knee of a woman in her 50s is shown pretreatment (left) and after 9 months of PES (right).

RN: Which patients are most likely to benefit from PES therapy?

Dr. Garland: All patients potentially may respond to this treatment modality. One of my most gratifying results occurred in a retired female physician in her 80s who had leukemia and was not a surgical candidate. She was bedridden with constant pain. With bilateral treatment her pain was controlled and she became ambulatory with assistive devices.

RN: Are there any patients for whom the treatment is not appropriate?

Dr. Garland: Treatment is appropriate for all patients. As a surgeon, I recommend surgery [vs. PES] for patients who are more likely to experience future deterioration [at a faster rate] because of medical conditions. A patient's support system may determine whether surgery is an option: PES requires weeks to months of treatment for optimal pain relief, and the device can be bothersome to use daily or nightly for so long. Medicare is now pays for [PES] and most carriers may eventually follow its lead.

RN: Are there objective measures of improvement associated with PES?

Dr. Garland: I have assessed improvement with x-ray and gait analysis.

RN: How does PES compare with other types of electrical stimulation therapy?

Dr. Garland: Percutaneous neuromodulation pain devices control pain; they do not alter the disease. Another option, pulsed electromagnetic stimulation, has not yet been shown to have a stimulatory effect on damaged articular cartilage. ■

Dr. Garland *is the director of the division of neurotrauma at Rancho Los Amigos Medical Center in Downey, Calif.*

By Diana Mahoney, New England Bureau