lost extensibility), and a knee with limited mobility.[2] The minimally invasive approach is appropriate for most but not all knees.

Umile Giuseppe Longo, M.D.
Campus Bio-Medico University
Rome, Italy

Nicola Maffulli, M.D., Ph.D.
Queen Mary University of London
London, United Kingdom
n.maffulli@qmul.ac.uk

Vincenzo Denaro, M.D.
Campus Bio-Medico University
Rome, Italy

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THE AUTHOR REPLIES: I am in general concurrence with the authors of these letters. Decreasing postoperative pain, as Moneypenny and Mercer suggest, is the driving reason to consider less invasive approaches to total knee arthroplasty and is at the foundation of my own clinical interest in the topic. That said, the subject of the optimal anesthetic and analgesic approach remains an area of some controversy. Femoral-nerve blocks are one reasonable (and widely used) approach. But a Medline search of the terms "analgesia total knee arthroplasty" with the use of "randomized controlled trial" as a limiting function returned listings of more than 100 randomized, controlled trials since 2002; literally dozens of anesthesia and pain protocols have been described. More important even than coming up with the single best approach — which might or might not exist — is the dramatic and appropriate increase in interest among clinician-scientists in minimizing patients' pain after this kind of surgery. Effective analgesia after knee replacement is critical to achieving the best possible clinical result, and is, not insignificantly, the humane thing to do.

As stated in my article, I agree that minimally invasive approaches to total knee arthroplasty are not necessarily for every patient, and they definitely are not for every surgeon. Both patient factors, such as the ones cited (among others), and surgeon factors, including previous training, experience, and the learning curve,[1] may come into play. It would be most important for each surgeon who is considering this approach to have a realistic idea of what is and what is not possible for him or her to achieve safely and accurately using minimally invasive approaches to total knee arthroplasty. I commend Longo et al. for keeping this important issue an explicit part of their surgical decision making.

Finally, I agree that there is strong evidence in the literature correlating obesity with the development of knee osteoarthritis. I also agree that patients should be counseled to maintain an ideal BMI in order to decrease the risk of the development of knee arthritis. What is less clear is whether very small reductions in body weight (such as the reduction from a BMI of 26.6, as in the case study, to less than 25.0, which would be within the "normal" range) would have any meaningful clinical effect in a patient who already has severe arthritis and activity-limiting symptoms. Still, the suggestions of Kashyap et al. are, of course, relevant to the population at large.

Seth S. Leopold, M.D.
University of Washington School of Medicine
Seattle, WA
leopold@u.washington.edu

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Mirror Therapy for Chronic Complex Regional Pain Syndrome Type 1 and Stroke

TO THE EDITOR: Complex regional pain syndrome type 1 is characterized by pain, sensory disturbances (e.g., pain evoked by light brushing of the skin [allodynia]), motor impairment (e.g., weakness), and sympathetic dysfunction (e.g., edema). Pain in this syndrome may be induced by a mismatch between proprioceptive feedback and motor action.[1] Visual feedback as a substitute for inappropriate proprioceptive feedback may reduce pain.[1,2]

Visual feedback may be achieved with mirror therapy, which was originally used to treat phan-

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tom pain.[2] However, the use of mirror therapy[3] and therapy involving imagery of movement[4] in patients with chronic complex regional pain syndrome type 1 (lasting 6 months or more) remains controversial.

We conducted a randomized, sham-controlled study involving 24 patients with stroke (11 men and 13 women). The median age was 62 years (range, 53 to 71), and the median time since stroke was 14 months (range, 7 to 21). Chronic complex regional pain syndrome type 1 of a paretic arm was diagnosed according to the criteria of Bruehl and colleagues.[5] The investigators were unaware of the study-group assignments. Of the 24 patients, 15 (62%) had left hemiplegia and 19 (79%) had ischemic stroke. No cases of thalamic involvement or shoulder subluxation were recorded. None of the patients had signs of depression.

We randomly assigned the 24 patients to one of three groups: one that viewed a reflected image of their unaffected arm in a mirror (the active-mirror group), one that viewed a covered mirror (the covered-mirror group), and one that received training in mental imagery (the mental-imagery group). All patients provided written informed consent.

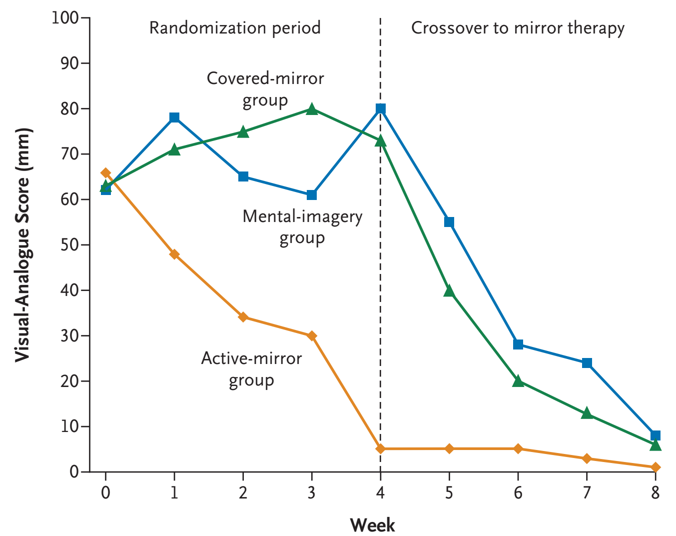

Figure 1. Changes in Pain, as Measured on a 100-mm Visual-Analogue Scale.

Scores on the visual-analogue scale range from 0 to 100, with higher scores indicating more severe pain. The dotted line represents the crossover point at which patients in all three groups began to use mirror therapy. Data points shown are mean values.

In both the active-mirror and covered-mirror groups, patients performed all of the cardinal (proximal to distal) movements of the affected arm for 30 minutes daily. Outcomes were measured in terms of pain on movement. The primary end point was the score for the severity of pain after 4 weeks of therapy, based on a visual-analogue scale from 0 to 100 mm, with higher scores indicating more severe pain. Secondary end points were motor function as assessed by the Wolf motor-function test, brush-induced allodynia, and edema after 4 weeks of therapy. The analysis-of-variance test was used. Baseline scores for pain on the visual-analogue scale were similar among the three groups ($P=0.71$). After 4 weeks of active-mirror therapy, the pain intensity decreased (Fig. 1), and motor function, brush-induced allodynia, and edema improved (data not shown).

In the active-mirror group, seven of eight patients (88%) reported reduced pain (median change in visual-analogue score, –51 mm; range, –70 to –18). In the covered-mirror group, only one of eight patients (12%) reported reduced pain, two patients (25%) reported no change in the pain level, and five patients (62%) reported increased pain.

In the mental-imagery group, two of eight patients (25%) reported reduced pain and six patients (75%) reported increased pain. At 4 weeks, the scores for pain on the visual-analogue scale in the active-mirror group differed significantly from those in the covered-mirror group ($P=0.002$) and mental-imagery group ($P<0.001$ for both comparisons).

After the randomization period, 12 patients crossed over to active mirror therapy. After the crossover treatment period, 11 of the 12 patients (92%) who switched to active mirror therapy from either the covered-mirror group or the mental-imagery group had a significant reduction in pain ($P=0.002$ and $P=0.004$, respectively).

Our results indicate that, unlike imagery therapy, mirror therapy effectively reduces pain and enhances motor function in the arm of patients with stroke and chronic complex regional pain syndrome type 1 in the arm. The traditional view that in patients with stroke, chronic complex regional pain syndrome type 1 in the arm is refractory to mirror therapy needs to be reconsidered.

Angelo Cacchio, M.D.
La Sapienza University of Rome
Rome, Italy
angelo.cacchio@tin.it

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Elisabetta De Blasis, M.D.
Santissimi Filippo e Nicola Hospital of Avezzano
Avezzano, Italy

Stefano Necozione, M.D.
Ferdinando di Orio, M.D.
University of L'Aquila
L'Aquila, Italy

Valter Santilli, M.D.
La Sapienza University of Rome
Rome, Italy

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Spinal Injuries in the Sichuan Earthquake

TO THE EDITOR: A magnitude 8.0 earthquake hit the densely populated region of Sichuan, China, on May 12, 2008, causing an estimated 374,643 injuries. By July 23, 2008, a total of 2728 wounded patients had been treated at the nearest major university hospital, which had 4300 beds and was located 92 km away from the epicenter, Wenchuan County.

A total of 13.0 to 15.2% of all patients with earthquake-related trauma who were admitted to the hospital had spinal injuries.[1,2] Multidetector-row computed tomography (CT) with multiplanar reformation is a fast and reliable method that can be used to determine the pattern and severity of spinal injury and the degree of spinal instability.[3] We retrospectively reviewed the multidetector-row CT scans of 223 patients with clinically worrisome spinal injuries after the Sichuan earthquake. Patients injured by earthquake-related motor vehicle accidents were excluded. The study was approved by the ethics committee of the West China School of Medicine, Sichuan University.

We used multidetector-row CT to focus on anatomical locations of the injury, injury types according to the Magerl (AO) classification (Fig. 1),[4] and the degree of narrowing of the spinal

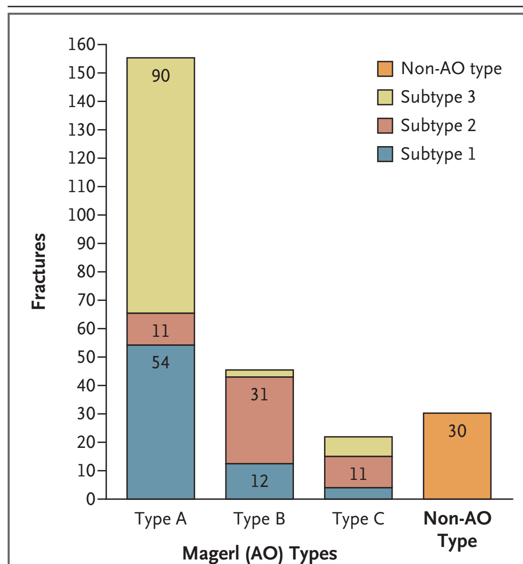

Figure 1. Classifications of the 252 Major Injuries According to the Magerl (AO) Types.

Type A (compression injuries of the anterior column) is subdivided into A1 (impaction fractures), A2 (split fractures), and A3 (burst fractures). Type B (distraction injuries of the anterior and posterior column with transverse disruption) is subdivided into B1 (posterior disruptions that are predominantly ligamentous), B2 (posterior disruptions that are predominantly osseous), and B3 (anterior disruptions through the disk). Type C (anterior and posterior element injuries with superimposed rotation resulting from axial torque) is subdivided into C1 (type A injuries with rotation), C2 (type B injuries with rotation), and C3 (rotational-shear injuries). The 252 major injuries were mainly composed of type A injuries in 155 vertebrae and type B injuries in 45 vertebrae. Type A3 comprises 58.1% of type A. We detected non–AO-type fractures, including occipital condyle fractures in 2 vertebrae, fractures of the odontoid processes in 5 vertebrae, hangman's fractures (spondylolisthesis of the axis consisting of a bilateral fracture pattern through the pars interarticularis or pedicles) in 4 vertebrae, Jefferson fractures (a burst fracture of the atlas or C1, first described by Geoffrey Jefferson in 1920, with both anterior and posterior arches failing) in 1 vertebrae, lateral mass fractures in 4 vertebrae, teardrop fractures in 4 vertebrae, and posterior arch or laminar fractures in 10 vertebrae.

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