Do Calcium and Vitamin D Help?

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SAN FRANCISCO — Recent data challenge the long-standing assumption that sufficient levels of calcium and vitamin D are fundamental to preventing and treating osteoporosis. Surgeons at Virginia Commonwealth University, Richmond, Dr. Johnson and his colleagues reported are the only American colleagues reported that have published data on patients undergoing gastric bypass surgery. Of those, 82% had a Roux-en-Y procedure, 12% laparoscopically. The average age was 40 years, and the average body mass index was 50 kg/m², reported Jason Johnson, M.D., a fellow in the division of minimally invasive and advanced laparoscopic surgery at Virginia Commonwealth University, Richmond.

The investigators randomly assigned 3,929 patients aged 70 and older to one of four groups — 800 IU daily oral vitamin D, 1,000 mg calcium, oral vitamin D combined with calcium, or placebo — and followed them for a median of 45 months (Lancet 2005;365:1621-8). Among the total, 698 (13%) sustained a new low-trauma fracture. Of these, 183 (26%) were hip fractures. Investigators observed no significant differences in the incidence of new, low-trauma fractures between patients who received calcium vs. those who did not (12.6% vs. 13.7%); between those who received vitamin D vs. those who did not (13.3% vs 13.1%) or between patients who received combination treatment and those who received placebo (12.6% vs. 13.4%).

Importantly, by 2 years into the Randomized Evaluation of Calcium or Vitamin D (RECORD) trial, only 55% of patients were still taking the calcium and vitamin D tablets, Dr. Orwoll noted. “This is more a compliance issue than an efficacy trial, but it’s in the real world,” he said. Analysis of various subgroups could find no effects on fracture rates from the supplements. The results contradict earlier findings. A 2003 study of 2,686 people aged 65-85 years who were vitamin D deficient found a 22% lower rate of fractures after 3 years in those who took oral vitamin D (300,000 IU every 4 months) vs. those who took placebo. A 2004 metaanalysis of five randomized, controlled trials of vitamin D for people older than 60 years found a 30% lower risk of falls in those taking vitamin D. A 2005 metaanalysis of seven randomized trials of vitamin D supplementation with 9,820 participants showed that people taking high doses (1,000 IU/day) of vitamin D had lower rates of hip fractures or any nonvertebral fractures than participants who took 400 IU/day. Nearly all studies included calcium supplements (JAMA 2005;293:2257-64).

“Differences between the RECORD trial and earlier trials may account in part for the conflicting findings,” Dr. Orwoll said. In an earlier trial in France, for example, 800 IU/day of vitamin D significantly reduced fracture risk, compared with placebo in frail, elderly patients with a mean age of 85 years; all resided in group housing and had very low baseline levels of calcium and vitamin D. (Lancet 2002;359:1347-54.)

Patients in the RECORD trial were a bit younger (mean age 77 years), had somewhat higher baseline levels of calcium and vitamin D, and were home dwelling instead of institutionalized. “So calcium and vitamin D might show the most robust effect in the frailest patients,” he suggested.

Whether or not calcium and vitamin D supplements reduce fracture risk, and in which patients, remains to be seen, but they are necessary for bone mass and muscle function. Whether supplements reduce fracture risk, and in which patients, remains to be seen, but they are necessary for bone mass and muscle function, Dr. Orwoll said. Most adults don’t get enough calcium and vitamin D, and current recommendations on adequate vitamin D levels are too low, he added.

The Institute of Medicine in 1997 recommended vitamin D supplementation at 600 IU/day for adults aged 51-70 years, 800 IU/day for ages 71-80, and 1,000 IU/day for older people. A serum level of 30-35 ng/mL of 25-hydroxyvitamin D (25(OH)D) may be ideal for maximizing GI absorption of calcium and avoiding elevated parathyroid levels, Dr. Orwoll noted. A recent poll of six experts suggested that much higher doses of vitamin D supplements are needed to reach those levels. The experts said that 1,000-1,600 IU/day vitamin D would be needed to reach serum levels of 30-32 ng/mL (25(OH)D).

Vitamin D and calcium supplements are inexpensive and safe, so there’s little reason not to use them, he said. Recommended daily calcium requirements are scientifically reasonable, even though they’re based more on physiologic data than on clinical outcome studies. Institute of Medicine guidelines in 1997 recommended calcium doses of 1,000 mg/day for adults aged 25-50, 1,200 mg/day for older adults, and 1,000-1,300 mg/day for pregnant or lactating women.

Vitamin D supplementation should be at least 800-1,000 IU/day, Dr. Orwoll said. For pure nutritional inadequacy, it may be appropriate to treat with a loading dose of 50,000 IU per week for 2 months followed by 1,000 IU/day, depending on baseline vitamin D levels. Vitamin D deficiency due to malabsorption or increased catabolism may require doses as high as 100,000 IU/day, he said.