

# Young Anorexics Starve Bones During Key Growth

BY BARBARA J. RUTLEDGE  
Contributing Writer

TAMPA — Anorexia nervosa reduces bone mass and puts young women at risk for early onset of osteoporosis, just at the time when they should be building peak bone mass, Dr. Steven Crawford said at the annual meeting of the International Society for Clinical Densitometry.

Health consequences of anorexia nervosa can be severe. In addition to loss of

bone density, the patient can suffer cardiovascular problems, muscle loss and weakness, severe dehydration, anemia, and leukopenia. Female patients with anorexia nervosa are amenorrheic. Anorexia nervosa leads to a sevenfold increase in fracture risk. Of adult women with anorexia nervosa, 38% have osteoporosis, and 50% have a bone mineral density (BMD) level below the fracture threshold.

The extent of bone damage is directly affected by the severity of malnutrition and

the disease duration. Consequences are more severe when disease onset occurs during the time of peak bone development. Approximately 60% of total bone mass is attained in the growth spurt that normally occurs in adolescence, and skeletal growth essentially is complete by age 18.

"Bone mineral density is lower when anorexia nervosa begins in adolescence than when it occurs in adult life, even when the duration of illness is comparable," said Dr. Crawford, a clinical psychia-

trist at the Center for Eating Disorders, Sheppard Pratt Health System, Baltimore.

Pathophysiology of low bone density in anorexia nervosa results from multiple factors, including undernutrition, hypogonadism, altered levels of bone-essential hormones and growth factors, excessive exercise, and hypercortisolism, among others. Undernutrition in anorexia nervosa leads to decreased levels of the sex hormones critical for bone development.

Levels of insulinlike growth factor-I (IGF-I) and growth hormone normally increase during puberty, and stimulate bone anabolism. In anorexic patients, IGF-I levels decrease, and patients acquire growth hormone resistance. Lack of calcium may prevent bone remodeling normally stimulated by exercise, and hypogonadism may

**SYNVISC**  
HYLAN G-F 20

UNIQUE NATIONAL  
HCPCS CODE

**Q4084**



**BMD 'is lower when anorexia nervosa begins in adolescence than when it occurs in adult life.'**

**DR. CRAWFORD**

impair the function of osteocytes that normally are activated by exercise.

Low BMD occurs at all skeletal sites in patients with anorexia nervosa, affecting both trabecular and cortical bone.

In addition to decreased BMD, another factor that contributes to bone fragility in patients with anorexia nervosa is decreased bone size. Patients with anorexia nervosa develop smaller bones in the vertebral body and femoral neck, compared with normal patients.

Dr. Crawford recommends a routine bone density scan in all patients with anorexia nervosa at disease onset and at least every 2 years thereafter. Restoration of normal weight can improve BMD in anorexic patients, but bone loss may continue, with bone restoration taking at least 21 months. "One-third of women recovering weight continue to have BMD z scores more than two standard deviations below the mean," said Dr. Crawford. Bisphosphonates are not approved for treatment of premenopausal women. Although adequate calcium and vitamin D intake should be provided to patients with anorexia nervosa, supplementation with calcium and vitamin does not increase BMD in anorexic patients. Some evidence suggests that a combination of twice-daily IGF-I administration and estrogen-progesterone treatment may be effective in increasing BMD in anorexic women. Androgen replacement studies have shown conflicting results.

Normally, patients with osteoporosis are advised to engage in weight-bearing exercise such as walking, stair climbing, and weight lifting. However, for patients with anorexia nervosa, the potential benefits of exercise might be offset by the risk of fractures, delayed weight gain, and exercise-induced amenorrhea. "In our program, we recommend 6 months of abstinence from exercise. Then we reintroduce activity into their lifestyle," he said. ■

## BRIEF SUMMARY FOR THE PHYSICIAN (CONSULT PACKAGE INSERT FOR FULL PRODUCT INFORMATION)

**CAUTION:** Federal law restricts this device to sale by or on the order of a physician (or properly licensed practitioner).

**INDICATIONS** Synvisc is indicated for the treatment of pain in osteoarthritis (OA) of the knee in patients who have failed to respond adequately to conservative nonpharmacologic therapy and simple analgesics, e.g., acetaminophen.

**CONTRAINDICATIONS** • Do not administer to patients with known hypersensitivity (allergy) to hyaluronan (sodium hyaluronate) preparations. • Do not inject Synvisc in the knees of patients having knee joint infections or skin diseases or infections in the area of the injection site.

**WARNINGS** • Do not concomitantly use disinfectants containing quaternary ammonium salts for skin preparation because hyaluronan can precipitate in their presence. • Do not inject Synvisc extra-articularly or into the synovial tissues and capsule. Local and systemic adverse events, generally in the area of the injection, have occurred following extra-articular injection of Synvisc. • Intravascular injections of Synvisc may cause systemic adverse events.

**PRECAUTIONS General** • The effectiveness of a single treatment cycle of less than three injections of Synvisc has not been established. • The safety and effectiveness of Synvisc in locations other than the knee and for conditions other than osteoarthritis have not been established. • Do not inject anesthetics or other medications into the knee joint during Synvisc therapy. Such medications may dilute Synvisc and affect its safety and effectiveness. • Use caution when injecting Synvisc into patients who are allergic to avian proteins, feathers, and egg products. • The safety and effectiveness of Synvisc in severely inflamed knee joints have not been established. • Strict aseptic administration technique must be followed.

• **STERILE CONTENTS.** The syringe is intended for single use. The contents of the syringe must be used immediately after its packaging is opened. Discard any unused Synvisc. • Do not use Synvisc if package is opened or damaged. Store in original packaging (protected from light) at room temperature below 86°F (30°C). **DO NOT FREEZE.** • Remove synovial fluid or effusion before each Synvisc injection.

• Synvisc should be used with caution when there is evidence of lymphatic or venous stasis in that leg.

**Information for Patients** • Provide patients with a copy of the Patient Labeling prior to use. • Transient pain, swelling and/or effusion of the injected joint may occur after intra-articular injection of Synvisc. In some cases the effusion may be considerable and can cause pronounced pain; cases where swelling is extensive should be discussed with the physician. • As with any invasive joint procedure, it is recommended that the patient avoid any strenuous activities or prolonged weight-bearing activities such as jogging or tennis following the intra-articular injection.

**Use in Specific Populations** • **Pregnancy:** The safety and effectiveness of Synvisc have not been established in pregnant women. • **Nursing mothers:** It is not known if Synvisc is excreted in human milk. The safety and effectiveness of Synvisc have not been established in lactating women. • The safety and effectiveness of Synvisc have not been established in children.

## ADVERSE EVENTS

### Adverse Events Involving the Injected Joint

**Clinical Trials:** A total of 511 patients (559 knees) received 1771 injections in seven clinical trials of Synvisc. There were 39 reports in 37 patients (2.2% of injections, 7.2% of patients) of knee pain and/or swelling after these injections. Ten patients (10 knees) were treated with arthrocentesis and removal of joint effusion. Two additional patients (two knees) received treatment with intra-articular steroids. Two patients (two knees) received NSAIDs. One of these patients also received arthrocentesis. One patient was treated with arthroscopy. The remaining patients with adverse events localized to the knee received no treatment or only analgesics.

**Postmarket Experience:** The most common adverse events reported have been pain, swelling and/or effusion in the injected knee. In some cases the effusion was considerable and caused pronounced pain. In some instances, patients have presented with knees that were tender, warm and red. It is important to rule out infection or crystalline arthropathies in such cases. Synovial fluid aspirates of varying volumes have revealed a range of cell counts, from very few to over 50,000 cells/mm<sup>3</sup>. Reported treatments included symptomatic therapy (e.g., rest, ice, heat, elevation, simple analgesics and NSAIDs) and/or arthrocentesis. Intra-articular corticosteroids have been used when infection was excluded. Rarely, arthroscopy has been performed. The occurrence of post-injection effusion may be associated with patient history of effusion, advanced stage of disease and/or the number of injections a patient receives. Reactions generally abate within a few days. Clinical benefit from the treatment may still occur after such reactions.

The clinical trials described above included 38 patients who received a second course of Synvisc injections (132 injections). There were two reports in nine patients (9.1% of injections, 23.7% of patients) of knee pain and/or swelling after these injections. Reports of two additional clinical trials in which patients received repeated courses of Synvisc treatment have appeared during the post-marketing period. One of these trials included 48 patients who received 210 injections during a second course of Synvisc treatment; the other contained 71 patients who received 211 injections during a second course of Synvisc treatment. A total of 157 patients have received 553 injections in the three clinical trials of repeated courses of Synvisc treatment. The reports in these trials describe a total of 48 reports of adverse events localized to the injected knee in 35 patients that occurred after injections that patients had received during their second course of treatment. These adverse events accounted for 6.3% of injections in 22.3%

of patients as compared to 2.2% of injections in 7.2% of patients in a single course of Synvisc injections. In addition, reports of two retrospective studies during the post-marketing period have described adverse events localized to the injected knee that have occurred after 4.4% and 8.5% of injections that patients had received during one or more repeated courses of Synvisc treatment.<sup>2,3</sup> Intra-articular infections did not occur in any of the clinical trials and have been reported only rarely during clinical use of Synvisc.

## OTHER ADVERSE EVENTS

**Clinical Trials:** In three concurrently controlled clinical trials with a total of 112 patients who received Synvisc and 110 patients who received either saline or arthrocentesis, there were no statistically significant differences in the numbers or types of adverse events between the group of patients that received Synvisc and the group that received control treatments.

Systemic adverse events each occurred in 10 (2.0%) of the Synvisc-treated patients. There was one case each of rash (thorax and back) and itching of the skin following Synvisc injections in these studies. These symptoms did not recur when these patients received additional Synvisc injections. The remaining generalized adverse events reported were calf cramps, hemorrhoid problems, ankle edema, muscle pain, tonsillitis with nausea, tachyarrhythmia, phlebitis with varicosities and low back sprain.

**Postmarket Experience:** Other adverse events reported include: rash, hives, itching, fever, nausea, headache, dizziness, chills, muscle cramps, paresthesia, peripheral edema, malaise, respiratory difficulties, flushing and facial swelling. There have been rare reports of thrombocytopenia coincident with Synvisc injection. These medical events occurred under circumstances where causal relationship to Synvisc is uncertain. (Adverse events reported only in worldwide postmarketing experience, not seen in clinical trials, are considered more rare and are italicized.)

## DETAILED DEVICE DESCRIPTION

Each syringe of Synvisc contains:

Hylan polymers (hylan A + hylan B) .....	16 mg
Sodium chloride .....	17 mg
Disodium hydrogen phosphate .....	0.32 mg
Sodium dihydrogen phosphate monohydrate .....	0.08 mg
Water for injection .....	q.s. to 2.0 mL

## HOW SUPPLIED

Synvisc is supplied in a 2.25 mL glass syringe containing 2 mL Synvisc.  
Product Number: 58468-0090-1 3 disposable syringes  
The contents of the syringe are sterile and nonpyrogenic.

## DIRECTIONS FOR USE

Synvisc is administered by intra-articular injection once a week (one week apart) for a total of three injections.

**Precaution:** Do not use Synvisc if the package has been opened or damaged. Store in original packaging (protected from light) at room temperature below 86°F (30°C). **DO NOT FREEZE.**

**Precaution:** Strict aseptic administration technique must be followed.

**Precaution:** Do not concomitantly use disinfectants containing quaternary ammonium salts for skin preparation because hyaluronan can precipitate in their presence.

**Precaution:** Remove synovial fluid or effusion before each Synvisc injection.

Do not use the same syringe for removing synovial fluid and for injecting Synvisc, but the same needle should be used.

Take particular care to remove the tip cap of the syringe and needle aseptically.

Twist the gray tip cap before pulling it off, as this will minimize product leakage.

Inject Synvisc into the knee joint through an 18 to 22 gauge needle.

To ensure a tight seal and prevent leakage during administration, secure the needle tightly while firmly holding the luer hub.

**Precaution:** Do not over tighten or apply excessive leverage when attaching the needle or removing the needle guard, as this may break the tip of the syringe.

Do not inject anesthetics or any other medications intra-articularly into the knee while administering Synvisc therapy. This may dilute Synvisc and affect its safety and effectiveness.

**Precaution:** The syringe containing Synvisc is intended for single use. The contents of the syringe must be used immediately after the syringe has been removed from its packaging. Inject the full 2 mL in one knee only. If treatment is bilateral, a separate syringe must be used for each knee. Discard any unused Synvisc.

This brief summary is based upon the current circular, 70230602, revised November 15, 2004.

**References:** 1. Raynauld JP, Bellamy N, Goldsmith CH, Tugwell P, Torrance GW, Pericak D, et al. (2002). An evaluation of the safety and effectiveness of repeat courses of hylan G-F 20 for treating patients with knee osteoarthritis. Osteoarthritis Research Society International, 2002 OARSI World Congress on Osteoarthritis, Sydney, Australia [Paper reference #PS128]. Presentation on File. 2. Leopold SS, Warme WJ, Pettis PD and Shott S. (2002). Increased frequency of acute local reaction to intra-articular Hylan G-F 20 (Synvisc) in patients receiving more than one course of treatment. *J Bone Joint Surg.* 2002;84-A(9): 1619-1623. 3. Waddell DD, Estey DJ and Bricker D. (2001). Retrospective tolerance of Hylan G-F 20 using fluoroscopically-confirmed injection and effectiveness of retreatment in knee osteoarthritis. Proceedings of the American College of Rheumatology Annual Meeting 2001. Presentation on File.

genzyme  
Eosogeny

A division of Genzyme Corporation  
55 Cambridge Parkway  
Cambridge, MA 02142  
1-888-3SYNVISC  
www.synvisc.com

SYNVISC and GENZYME are registered trademarks of Genzyme Corporation.  
©2007 Genzyme Corporation. All rights reserved. Printed in USA.

S-00269.A 01/2007