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Injection may be the best bet for young athletes' knee pain

Closure of the tibial growth plate—the definitive remedy for Osgood-Schlatter disease—may be years away. Adolescent athletes sidelined by pain need relief now.

PRACTICE CHANGER

Consider giving dextrose/lidocaine injections to adolescents with Osgood-Schlatter disease (OSD) that persists despite physical therapy.¹

STRENGTH OF RECOMMENDATION

A: Based on one well-designed, randomized controlled trial (RCT).

Topol GA, Podesta LA, Reeves KD, et al. Hyperosmolar dextrose injection for recalcitrant Osgood-Schlatter disease. *Pediatrics*. 2011;128:e1121-e1128.

ILLUSTRATIVE CASE

A 13-year-old boy comes in to your office for follow-up of anterior knee pain from OSD that has not responded to 2 months of physical therapy. He is still unable to play on his recreational soccer team. What treatment can you offer to help him return to the sport he enjoys?

OSD is characterized by inflammation of the growth plate just below the knee, the result of repetitive strain on the secondary ossification center of the tibial tuberosity.² Closure of the tibial growth plate is the definitive remedy for OSD, but the pain that some adolescents experience until that happens can be long-lasting and considerable. Nine years after diagnosis of OSD, one study found, up to 60% of patients who had received conservative treatment reported pain on kneeling and 18% had sports limitations.³

Inability to play may affect self-esteem

Adolescents whose recreational activities are limited due to OSD may experience a number of negative effects, including alienation from friends, altered peer group dynamics, and a decline in self-esteem. Surgery, which involves excision of the pain-producing ossicle with or without tuberculo-plasty, relieves the pain and allows patients to return to their chosen sport in 90% to 95% of cases that have not responded to conservative treatment.^{4,5} For a self-limiting (although prolonged) condition like OSD, most physicians and patients would prefer to avoid surgery and opt for a more conservative approach.

Dextrose injections have been shown to be safe and effective when used for the treatment of tendon and ligamentous disorders such as Achilles tendonitis and lateral epicondylitis, although the mechanism of action is not clear.^{6,7} The study detailed in this PURL is the first prospective RCT of dextrose injections for the treatment of OSD.

STUDY SUMMARY

Injections get adolescents back in the game

Topol et al¹ sought to compare the efficacy of injections of dextrose and lidocaine with lidocaine-only injections or supervised usual care in treating OSD in young athletes. Sixty-six Argentinian boys and girls ages 9 to 17 years, all of whom had anterior knee pain



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and participated in kicking or jumping sports on organized teams, were considered for the study. The absence of either patellofemoral crepitus or proximal patellar tendon tenderness was a prerequisite for participation, as was reproduction of the anterior knee pain and localization of pain precisely to the tibial tuberosity during a single leg squat to confirm the OSD diagnosis.

After diagnosis, the patients completed ≥ 2 months of formal and gently progressive hamstring stretching, quads strengthening, and gradual reintroduction into their respective sports. Those who experienced pain during team play that persisted for ≥ 3 months—54 patients, all but 3 of whom were male, with a total of 65 knees requiring treatment—were included in the study. Participants were randomized to the usual care group or to one of the injection groups, which was blinded to patients, guardians, and physicians.

The injection groups received a solution of lidocaine 1%, alone or with 12.5% dextrose, at the start of the study and again at 1 and 2 months. Adequate injection was determined by complete pain relief during a single leg squat, which was also used to determine both proximal and distal points of tenderness. Both injection groups received 0.5-mL injections with a 27-gauge needle, repeated at approximately 1-cm intervals for a total of 3 to 4 midline injections. After 5 minutes, the leg squat was repeated to detect any remaining pain, and painful areas were injected until the patient could do a pain-free leg squat.

Because pain reduction may precede full healing, those in both the lidocaine-only and the dextrose-lidocaine groups received injections on all 3 occasions even if they were pain free. They were instructed to avoid running for a week after the initial treatment and then to run as tolerated. Subsequent treatments required a 3-day rest from running. Participants were able to return to their sport after the second injection and rest period.

Patients in all 3 groups received handouts explaining hamstring stretches and quadriceps strengthening exercises. The usual care group received individual instruction from a physical therapist. They were also



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given a video and returned at least once, both to ensure that they were performing the exercises correctly and to encourage compliance.

■ **The primary outcome** involved the Nirschl Pain Phase Scale (NPPS), a 7-point measure of sports-related symptoms and level of participation. Scores of 4 to 7 represent sports limitation resulting from pain. Scores <4 (which may involve soreness or pain but participation in the sport is unlimited) and 0 (asymptomatic participation) were the threshold goals for the study.

The groups were similar at baseline, and follow-up was 100%. At 3 months, NPPS scores improved more in dextrose-treated knees than in either the lidocaine-treated knees (3.9 vs 2.4; $P=.004$) or those who received usual care (3.9 vs 1.2; $P=.001$), and lidocaine alone was significantly better than usual care (2.4 vs 1.2; $P=.024$). More than 90% of participants in both injection groups achieved unlimited sports participation by 3 months. However, knees treated with dextrose were significantly more likely than lidocaine-treated knees to allow asymptomatic participation (NPPS=0), with 14 of 21 knees and 5 of 22 knees, respectively, being pain-free. After one year, more dextrose-treated knees than lidocaine-treated knees were asymptomatic with sports participation (32 of 38 vs 6 of 13; $P=.024$).

There were no reported adverse effects during this study and fewer than 10% of subjects required acetaminophen for postinjection pain control.

WHAT'S NEW

OSD can be safely and effectively treated
This study found dextrose injections to be

safe, well tolerated, and effective in treating patients with intractable OSD symptoms. The results suggest that the duration of both the sports limitation and sports-related symptoms may be reduced with dextrose injections in adolescent athletes with recalcitrant OSD.

CAVEATS

Lack of validated measure, controls

NPPS is not an ideal measure of OSD symptoms because it has not been validated. The failure to use a validated measure of tendinopathy symptoms (eg, the Victorian Institute of Sport Assessment-Patella⁸) is a significant limitation of this trial. The athletes included in this study had already failed to respond to the usual treatment, which suggests that injections should be reserved for those who have tried hamstring stretching and quad-strengthening exercises.

CHALLENGES TO IMPLEMENTATION

Patient and provider comfort may be an issue

Although the injections in this study were well tolerated, there is a risk of infection, bleeding, and pain with any injection or invasive procedure. In addition, adolescents often have difficulty tolerating injections, especially repeated needlesticks like those called for in the proposed treatment. The nonviscous nature of dextrose allows 27- to 30-gauge needles to be used, which may make the injections easier for teens to tolerate. Some physicians may be hesitant to start these young patients on a new injectable therapy. **JFP**

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