

Repetitive-Stress Injuries in Young Athletes

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There has been a definite increase in overuse injuries in children. Repetitive-stress injuries (RSI) used to be a relatively rare problem for the young, or so it seemed. This has all changed. Of course, you would see an occasional Osgood-Schlatter's or epicondylitis, but with the emergence of organized sports and their emphasis on repetitive drills, as well as the more recent trend toward sports specialization in young athletes, RSI is now a relatively common problem. Chiropractors are experts at treating these types of injuries. If managed carefully, most adolescent athletes can recover completely from these injuries.

Let's take a specific example of a RSI: spondylolysis. It is estimated that 15 percent to 20 percent of gymnasts develop this type of stress fracture. However, it affects many young athletes who perform any activity that requires repetitive hyperextension of the lower back.^{1,2} Dancers, divers, gymnasts, high jumpers, offensive linemen, pole vaulters, weight lifters and wrestlers all demonstrate an increased incidence of spondylolysis.

One of the reasons for this problem is that the pars interarticularis does not fully mature until about 25 years of age. Unfortunately, in many sports an athlete is actually considered "old" and past their prime at age 25. The accepted theory is that repetitive activity from the paravertebral muscles pulls on the relatively fragile facet joint, which eventually causes fatigue and micro- or stress fracture.

Early on, most of these stress fractures are not visible on plain films. SPECT bone scans and CT are great tools for diagnosing this type of fracture. The bone scan will identify whether there is a stress fracture. Bone scanning achieves almost 100 percent sensitivity in finding stress fractures in the pars interarticularis. Unfortunately, these lesions can remain positive or reactive for a long time. Therefore, to best evaluate anatomic healing, CT is generally the best modality.

<i>Sport</i>	<i>No. Athletes</i>	<i>Spondylolysis</i>	<i>% With Spondylolysis</i>
Diving	57	23	40.35
Wrestling	80	20	25
Weight Lifting	112	25	22.32
Modern Pentathlon and Triathlon	54	11	20.37
Track/Field	353	61	17.28
Sailing	128	22	17.18
Gymnastics	673	112	16.64
Football	400	65	16.25

Skiing	154	25	16.23
Judo and Martial Arts	64	10	15.62
Bobsledding	36	5	13.88
Cycling	95	13	13.68
Fencing	143	19	13.28
Tennis	306	36	11.76
Canoeing	69	8	11.59
Water Skiing	18	2	11.11
Boxing	27	3	11.11
Water Polo, Swimming, Syncro.	307	34	11.07
Rugby	65	7	10.76
Volleyball	150	16	10.66
Shooting	76	8	10.52
Basketball	174	17	9.77
Luge	25	2	8
Rowing	246	19	7.72
Ice and Field Hockey	170	13	7.64
Handball	42	3	7.5
Ice Skating	42	3	7.14

The typical protocol for ruling out a spondylolysis is to obtain a SPECT bone scan to determine whether there is a stress fracture. If the bone scan demonstrates a spondylolysis, a CT is requested to evaluate the anatomic involvement of the fractured bone. Reverse gantry-angle CT scanning has become the imaging modality of choice to scan for defects in the pars interarticularis and posterior spine. Standard CT scans yield only tangential views of the lumbar spine, but by turning the gantry 180 degrees and obtaining a reverse angle "shot," the occult lyses in the posterior arch can then be evaluated.

Doing a CT scan right away may not be necessary, but it is important to perform one at about 12 weeks into conservative treatment to determine if there is bony healing. If there is no evidence of spondylolysis on the plain film and the bone scan is mildly reactive, waiting 12 weeks to perform the CT scan would be reasonable. It should be noted that we are not performing a complete lumbar CT scan. We are only scanning the level of the known spondylolysis that has already been determined by the bone scan. This markedly reduces the patient's exposure to radiation.

Typically, patients wear a brace for 12 weeks and discontinue their sporting activity. Isometric exercises to maintain and strengthen the trunk muscles are performed, and once pain has subsided, gradual mobilization and isotonic exercises of the trunk muscles are included. If the CT scan shows signs of union of the defects, the brace can be removed, but sporting activity cannot be started for three more months. If, however, there is no evidence of healing, then more aggressive treatment such as a surgical pinning may be necessary. If the CT scan demonstrates confirmed union of the pars interarticularis, the patient can gradually return to training.¹

I'm not suggesting that all young athletes with back pain need to have a bone scan and a CT. However, back pain in young athletes should be taken very seriously. We should especially consider spondylolysis when these patients don't respond quickly to care.

Other kinds of RSI injuries that adolescent athletes develop include bursitis, tendonitis, epicondylitis, Osgood-Schlatter's disease, patellar femoral syndrome, shin splints and stress fractures other than spondylolysis. Again, chiropractors generally are very good at treating these types of injuries, except in the case of occult fractures through the growth plate, the epiphysis. In those cases, surgical intervention is necessary.

Using a bone scan to determine if there is indeed a stress fracture is very helpful. Once a stress fracture has been ruled out, the clinician can confidently determine a treatment schedule for a young, healthy patient. The patient can be allowed to test their recovery with prudence. In the case of a stress fracture, the recovery time will most likely require that the patient be off training and out for the season.

As the treating clinician, you need confirmation of the injury not only for the diagnosis, but also possibly to support your recommendations and treatment plan. I personally have had difficulties with overzealous athletes, coaches and parents. However, with visual evidence and scientific statistical information on your side, most people will listen to reason.

References

1. Garry J, McShane J. Lumbar spondylolysis in adolescent athletes. *J Fam Pract* August 1998.
2. Table: Rossi F, Dragoni S. *Radiography* 2001;7.
3. Fujii K, Katoh S, Sairyo K, et al. Union of defects in the pars interarticularis of the lumbar spine in children and adolescents: the radiological outcome after conservative treatment. *J Bone Joint Surg* March 2004.

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