CALENDAR OF EVENTS

Nov 28 **First Date for Competition in Basketball and Wrestling**

Jan 21 **Athletic Training Forum - 6:30 p.m. at Rocky Mountain College**

Congratulations to the state's championship teams in golf, cross country, soccer, football, and volleyball this past fall. A job well done!

The Sports Page is published by Montana Orthopedics & Sports Medicine PC and Orthopedic Surgeons, PSC. If you would like to receive this free publication, write or call:

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www.montanasportsdoc.com

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Dr. Shenton and Dr. Elliott are orthopedic surgeons with an extra fellowship year of training in sports medicine, and Dr. Klepps is an orthopedic surgeon with and extra fellowship year of training in shoulder in shoulder and elbow injuries. They and their colleagues provide comprehensive sports medicine care.

sportsmedicinenews
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Coaches Say It All The Time; but, How do Athletes Really Step Up To A New Level?

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the SPORTSPAGE

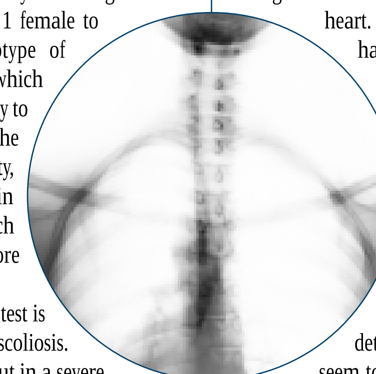
WINTER 2003 WWW.MONTANASPORTSDOC.COM VOLUME 12, NO. 4

ADOLESCENT SCOLIOSIS

By: Marc Nynas, D.C.

One of the most common spinal diseases relating to adolescents is a scoliosis. There has been much debate as to the cause of this disease and as to the proper treatment of the curvature.

Of most interest for those dealing with adolescent athletes is the idiopathic scoliosis (which has no known origin) which develops between ten years of age and skeletal maturity. There is a 9 to 1 female to male predominance of this subtype of scoliosis, and the time period in which progression of the curve is most likely to appear is 12-16 years of age. Once the spine has reached skeletal maturity, progression is less likely until later in life when degenerative changes such as compression fractures are more likely to occur.



A very simple test called Adam's test is the standard used for screening for scoliosis. This is best done by a professional but in a severe case this will show up to even a casual observer. To perform this test you would have the person being screened facing away from you and observe the spine from behind as well as trace the spinal bones to note any gross curvature. From there if a curvature is detected you would simply have the person being screened bend forward and observe the ribs along side of the spine to see if one side is relatively higher than the other. This test should be done from both behind and in front of the person being observed as that allows for different regions of the spine to be observed. Most agree that an observed curvature that disappears in this position has a greater chance of success with conservative treatment.

An athlete having a scoliosis does not exclude them from participation of any particular sports but there are some things that the athletes, parents, and coaches should be aware of. The most important factor is that if the curve is greater than 20 degrees there is a 10 times greater incidence of congenital heart problems. When the athlete has their yearly physical this must be addressed and any signs or symptoms of heart problems should be taken seriously and dealt with immediately. Pulmonary function may also be compromised as a result of the scoliosis, but this is more accurately described as a problem relating to the expansion of the ribs during breathing. A classic sign related to this is the "rib hump" of scoliosis.

Many times parents, or even the athlete, will be concerned about participating in contact sports such as football, wrestling, hockey, or martial arts. There have been no studies that have shown participation in these sports increases the risk that the curve will progress. If the athlete chooses to participate in these activities even closer monitoring is required by their physician.

One disorder that may be associated with scoliosis is called pectus excavatum. This disorder is where the sternum is depressed into the chest cavity. If this is present in an athlete the heart needs to be evaluated before they begin any rigorous exercise as there is not proper space for the heart. Many times however these athletes will have had heart surgery as a very young child and are aware of this serious complication.

There are several different treatment options for scoliosis ranging from surgeries to bracing, and including chiropractic adjustments and physical therapy. Conservative treatments such as chiropractic and physical therapy rely on the curve being functional as determined by lateral flexion x-rays and seem to work best if caught at a young age. The intent of the chiropractic adjustment is to realign the spine and restore proper motion to the joints of the spine. The intent of physical therapy and exercise is to stretch the shortened muscles on the inside of the curve while strengthening the weakened muscles on the outside of the curve. It should be noted that there has also been correlation of the proprioception or balance system and exercise as it relates to effective treatment of scoliosis. These conservative measures may be used together.

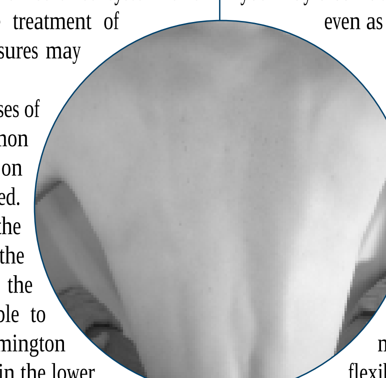
Bracing is used in moderate cases of scoliosis. There are three common types of brace used depending on where the apex of the curve is located. The Milwaukee brace is used if the curve is in the upper portion of the back. This is the brace that has the chin piece and is more noticeable to other people. The Boston or Wilmington braces may be used for curvatures in the lower part of the back and these come up to just under the armpits. It should be noted that a successful brace does not decrease the curve it merely halts the progression of the curve during those years when it is most likely to progress. Braces are typically used for a moderate scoliosis of 25 to 40 degrees that is progressing in x-rays taken three to six months apart.

Surgeries are used in severe cases of scoliosis. These are used mostly in patients who still have open growth plates on x-rays and a curvature of over 50 degrees. There are several different types of surgery options but the most common involves inserting rods and hooks into the spine and straightening the spine.

In a post-surgical athlete activities will be limited from things that will place undue stress on the spine. This is related to the hooks and rods implanted in the spine. Activities that should be avoided would place trauma to the spine like football or hockey, and also activities that would promote hyper-flexibility of the spine such as gymnastics and certain diving maneuvers. Post surgical athletes may continue with activities such as swimming, tennis, and walking.

One aspect of treatment often overlooked is the psychological issues associated with it. Imagine for a moment a freshman girl moving to a new town and starting classes wearing a Milwaukee brace for a spinal deformity. Even in a more moderate setting just the potential anxiety about a brace can be very detrimental to an adolescent.

X-ray evaluation remains the gold standard for diagnosing and monitoring scoliotic patients. A baseline x-ray is taken as soon as the curve is discovered by observation or Adam's test and then is repeated every three to six months depending on the age of the patient, severity of the curve, risk factors for progression and treatment options chosen. A basic x-ray will be from the front and show the entire spine and also a view from the side. Depending on the physician you may also have x-rays taken as you bend to the side or even as you hang from a bar.



Several factors may increase the risk that the curve will progress. If there are two curves in one spinal region or the main curve is in the lumbar region with a compensatory curve in the thoracic region it is more likely to progress. Other factors include age, age at onset of menarche, an absent or +1 Risser sign (this is an x-ray finding which determines skeletal maturity), curves of more than 20 degrees, flexibility, and family history.

We have discussed only the idiopathic scoliosis, but there are several less common causes of scoliosis. These include infections, traumas, radiation to a growing spine, tumors, degeneration of joints, and misshapen vertebrae. So while it is true that an untrained observer can detect a scoliosis it should be looked at by a licensed professional to rule out other more serious disease and to be properly monitored.

sportsperformance

Suzette Hackl, ATC

WARMING UP TO PREVENT INJURIES

A warm-up period prior to working out, practicing or competition is extremely important to prevent injuries. A proper warm-up will allow your muscles to increase heat production which increases flexibility, muscle elasticity and joint mobility, all of which results in a decreased risk of musculoskeletal injuries.

It is important to remember to have a general warm-up session (approximately 5 to 10 mins) to increase blood flow to the muscles and to gradually increase heart rate. The increased blood flow to the muscle is what allows the muscles to "warm up" and gain flexibility. Also this general warm-up allows and prepares the athlete for the specifics of an activity or sport. During this general warm-up phase light active stretching should also be performed. While stretching one should feel a mild to moderate stretch but nothing painful. Stretches should be held for 30 to 60 seconds and be repeated three time.
Some examples of different types of general warm-up stretches include static, ballistic, and dynamic. A static stretch is where the athlete will hold the stretch at the end position for 30 to 60 seconds, relax and repeat. Static stretching is an easy skill to acquire, improves flexibility and there is a low likelihood for injury. Ballistic stretching involves active stretching using more of a bounce-like movement where the end point is not held. With ballistic stretch one must use extreme caution because there is an increase risk for injuries. Ballistic stretching also does not allow true stretch reflex to occur. Dynamic stretching involves using sports specific actions but avoids bouncing and aggravating movements. Dynamic stretching is very similar to sports specific drills, etc.

One can also incorporate PNF stretching into their regime. Proprioceptive neuromuscular facilitation (PNF) incorporates both active and passive stretches where one uses muscular inhibition to better stretch the muscle group. With PNF there are many techniques, but one of the most common include a contract-relax stretch. Here the partner stretches the athlete to the end point, hold, then have the athlete push against the partners resistance and relax. When the athlete stretches again he/she will be able to go further then the previous end point. One downfall to PNF stretching though, is that it usually requires a stretching partner.
`Next is the specific warm-up which incorporates the specific requirements of the sports. The specific warm-up should be perform before practice and competition. Some examples of specific warm-up drills include: bounding, skipping, figure 8's, carioca, etc. Specific warm -up should also include drills for that particular sport ie hitting in volleyball, defensive drills in basketball, etc.

Once the activity, practice or competition has been completed, it is important to remember that it is just as significant to cool down incorporating gentle stretching and light activity to prevent injuries. Ones body will develop more flexibility gains if the muscles are stretched after activity. Remember to stretch before to prevent injuries; stretch afterwards to increase general flexibility and decrease risk for injuries as well.

askthesportspecialist

Question: I am a sixteen year old girl who competes in both cross country and track. During the last two seasons I have gotten really bad shin splints that hurt before and after I run. What causes shin splints and what can I do to treat them?

Answer: First of all, shins splints is a catchall phrase that describes lower leg pain. Shin splints is a painful condition that effects the anterior (front) side and medial aspect (inside) of the lower leg. Shin splints is also know as medial tibial stress syndrome.

Many different conditions are defined under the term "shin splints". Shin splint pain can be caused by a stress fracture, chronic anterior compartment syndrome (where there is a build up of pressure in the muscle and its surrounding compartment) or muscle strains. Usually shin splints are due to repetitive overuse commonly seen in running sports and basketball. Other causes of shin splint pain may be due to improper shoes (either worn out or not properly fit); changes in running surfaces (running on concrete vs asphalt vs grass); overtraining; inflexibility in the lower leg specifically the calf muscles and the muscles that flex the foot; or malalignment of the foot (excessive pronation or pronation).

There are four classifications or degrees of shin splints. The first degree is where there is pain after activity; second degree there is pain before and after activity; third degree is when pain is before, during and after activity and is affecting performance; and the fourth degree is that pain is so severe at all times and one can not perform their sport. It is important to catch and treat shin splint pain before reaching the third or fourth degrees.

To treat shin splints one may want to first see a physician to rule out a stress fracture and anterior compartment syndrome. After a stress fracture and an anterior compartment syndrome have been ruled out one can try conservative management which would include relative rest (biking, swimming, etc); the use of over-the-counter anti-inflammatories (ibuprofen); ice massage; a flexibility program for the calf muscles; and a strengthening program for the foot flexors (towel curls, etc). One can also try taping the arches or taping around the lower leg. There are also some over the counter neoprene sleeves that can be purchased to help alleviate shin splint pain as well. Orthotics (prescribed by a physician) to correct any malalignment may also be helpful in decreasing pain and discomfort.

I hope this answers your question and will help you treat your shin splint pain better. Good Luck to you in your cross country and track seasons.

thementalgame

Dr. Russel Lord – MSU-Billings

COACHES SAY IT ALL THE TIME; BUT, HOW DO ATHLETES REALLY STEP UP TO A NEW LEVEL?

As careful observers of athletic skill development see all the time, improvement in the skilled movements required for athletic excellence does not follow a smooth, linear progression from unskilled to expert performance. Neither improvement nor decrement shows a one-to-one relationship between time and effort expended and proportion of improvement. Instead, skill development occurs in fits and spurts. Periods of stasis with little or no change are broken by periods of rapid change to a new level of performance. In young developing athletes these periods of rapid change trend toward enhanced skill and performance, in contrast to often abrupt and unpredictable decrements experienced by aging athletes of all skill levels. Rapid changes in skill often - maybe even typically - occur without volitional control by the athlete, without conscious awareness of how or why the change occurred. Something just clicked into place - or suddenly disappeared.

Despite the paradox that time and effort spent practicing do not predict improved skill in a linear manner, virtually no one discusses it. Perhaps the silence occurs because everyone involved in sport knows that time and effort are absolutely necessary - but not sufficient - conditions for improvement. Thus, everyone focuses on the more controllable dimensions of time and effort. Certainly coaches and athletes should not ignore the crucial importance of time and effort. However, the fact that skill development is highly nonlinear should not be ignored or swept under the proverbial rug just because it is troubling and threatening. It needs to be confronted by anyone seeking to truly understand skill improvement.

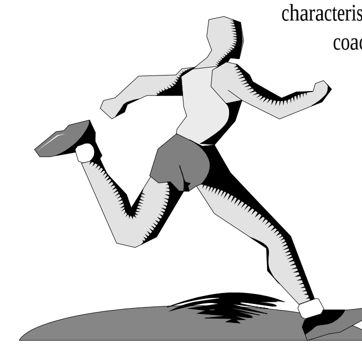
The obvious goal in all attempts to improve athletic performance is to move from a present skill level to a new, more highly coordinated, more highly skilled level of movement, but how often can anyone predict just when someone will break through to a new, higher level of skill? Instead, athletes and coaches typically are limited to describing or demonstrating a change after it has occurred. However, simply describing two different levels of skill does not explain why or how an athlete moved to a new skill level. (Though we all hear them talk about having stepped up a level, how often do coaches explicitly explain how to do so, effectively teach how to achieve it, and accurately predict when it will occur?)

thementalgame

Continued...

One of the means for getting beyond mere description and gaining insight into athletic performance is dynamical systems theory - which is the application of physics and engineering concepts to the study of human movement. Consider a person's present level of skill performance as his/her steady-state or in-phase pattern. After all, he/she can sustain that level of performance most of the time, despite changes in environment, competitors, etc. This behavioral steady state is the stable point around which the various muscle-skeletal components (coordinative structures such as bones, muscles, joints, etc.) required to execute the skill vary to only a small degree. At this skill level athletes are in an energy efficient state, which is their present, optimal level of effectiveness. Unless there is sufficient disruption to cause enough instability in performance that they cannot return to this level, athletes remain at this performance level. Confronted with too little disruption (perturbation in dynamic systems language), athletes simply return to this stable, comfortable, steady-state performance.

A disruption sufficient to require a new level of skill because task demands exceed the capacity of the athlete's current steady-state, in-phase movement pattern, causes the body to display the characteristics that define dynamic systems. Despite what some coaches imply by claiming that sport success is 90% mental and 10% physical, skilled human movement is not a hierarchy in which the brain imposes control and the body (via relevant coordinative structures) merely does as it is directed. Like any other complex, highly integrative system in which various constituent components must be coordinated, our bodies function as dynamic systems. Dynamical systems theory explains critical elements in how human movement changes from one steady state to another. Skilled movements change from (1) in-phase (previous steady state) to (2) out-of-phase transition (instability where skill level is inadequate to task demands) to (3) in-phase (new steady state) due to the self-organizing properties of the body's coordinative structures. When this sequence occurs, the athlete perceives that something new just clicked. The changes in skilled movement that occur in this sequence are nonlinear - that is, changes are not predictable from inputs. This means that a specific change in speed of movement, or strength required, or any other dimension of the task does not correspond predictably with changes in skill level. For instance, even a small change in the speed at which a task must be done can cause performance to look completely unskilled.



This surprises no one who is a careful observer of sport skill development. Performance change does not follow an algorithm in which X amount of time, effort, or other factor assures Y amount of improvement. To wit:
* (10 more pounds in squat) + (5 more degrees hip flexion) does not equal (10 more yards on punt)
* (5 more mph on pitch) does not equal (2 more strikeouts per game).

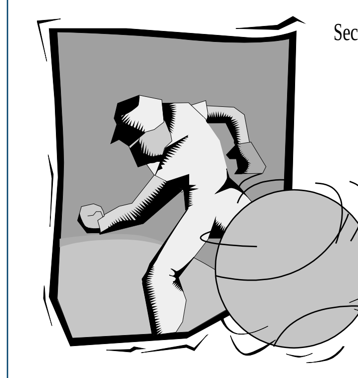
In either illustration, changed input value may correspond to a change in performance outcome, but it may not and, it might lead to either an increase or a decrease in skill of performance.
Consider some specific sport examples that might seem familiar to careful observers of sport.
* Without any loss in speed, a high jumper increases his/her squat by 50 pounds but jumps no higher - then, at another point in time, with no change in strength, he/she begins to consistent clear a previously unattainable height.
* A .300 hitter hits .350 against a new pitcher throwing 100 mph but, at another point in time slumps to .250 even against familiar pitchers throwing only 80 mph.
* A golfer, with no change in strength or speed and less total minutes of practice time suddenly understands how to strike the ball more effectively.

These unpredictable changes occur because the complex coordinative structures (i.e., bones, ligaments, tendons, muscles, etc.) that comprise the human body are a powerful self-organizing, dynamical system. They are not controlled robotically by the brain, but form an interactive system. Just as surely as new mental images exert an effect on performance, new demands on body structures can trigger the out-of-phase, transition from a prior steady state to a new in-phase, steady state of performance skill without the athlete consciously controlling the change or being aware of what caused it.

Non-sport examples of this have been studied for years. People flexing their index fingers settle into an in-phase steady state pace but then transition involuntarily as speed is increased. They depart from synchrony and rhythm without intending to do so or thinking about it. Another example is human gait. Along a continuum from walking to running, everyone is familiar with in-phase ‡ out-of-phase (transition) ‡ in-phase cycles. A person's step cycle changes from stable (in-phase) at a slower rate to unstable (out-of-phase, transition) at a faster speed, and then again becomes stable (in-phase) at that new, faster rate. These transition phases are not linear and do not depend upon conscious control. A final illustration occurs in the coordination required to throw a ball at a moving target or shoot a basketball from varying distances and heights of release - all without conscious, voluntary control of the action between its start and finish.

Hopefully, these examples facilitate understanding and insight into the power of dynamical system theory to help explain one aspect of how athletic skill changes - how athletes might move to the next level. Here are some reasonable steps for coaches, athletes, and others who want to improve athletic performance.

First: Carefully observe and record the stability in an athlete's performance in response to changes in the environment (control parameters in the language of dynamic systems theory). These changes include strategic variables (i.e., game situations, etc.) as well as environmental factors (i.e., weather, crowd, etc.) as well as the environment created by one's competitors (i.e., the speed at which one must respond, the number of decisions one must make because your competitor presents more options than does another, etc.). Documentation of the athlete's in-phase, steady state indicates his/her present, energy efficient and preferred pattern of movement. This is the starting point for any change as well as the state to which the athlete will strive to return, even without consciously intending to do so, due to the self-organizing nature of our body systems.



Second: Carefully observe and record the points where the athlete's behavioral pattern - his/her level of skill - is disturbed enough for instability to appear. Especially note the out-of-phase, transition state as quickly and accurately as possible. Since changes to new in-phase patterns occur in non-linear rather than linear fashion, neither the athlete nor the observer is likely to catch the exact initiation of the out-of-phase transition the first time it occurs. Careful monitoring across time is essential to establish the pattern of in-phase-out-of-phase-in-phase states.

ESPECIALLY AVOID CONFUSING:
* disruptions attributable to the environment (i.e., weather, crowd, etc.),
* disruptions attributable to the athlete or performer him/herself (i.e., tiredness, overtraining effects, health, mental attentiveness or distractedness, etc.), and
* disruptions attributable to competitors (i.e., a pitcher who throws more pitches with precision, a cornerback who is faster than any others, an opponent who is stronger, someone who talks constantly, etc.).

Third: Having identified some of the mechanisms that initiate the out-of-phase, transition state that is required to adapt to a new, higher level of skilled movement:
* create means for shortening the time the athlete spends in that state, (i.e., different drills, related tasks but in completely different setting, etc.),
* alter various sources of disruption (control parameters) to monitor athlete responses to different sources of disruption (i.e., distract the athlete's conscious control of a skill in order to allow specific systems required in the skill to self-organize, focus athlete's attention on another task or dimension of the same task in order to enhance integration and diminish attempts at hierarchical, conscious, control, etc.).

Fourth: In creating the disruption in skill needed for the athlete to truly step up to the next level, be sure to:
* explain to the athlete the necessity of struggling through periods of being uncomfortable, inefficient, and ineffective during an out-of-phase, transition state in order to achieve a new, behavioral steady state where he/she will experience heightened comfort, efficiency, and effectiveness, and
* be patient and persistent, modeling those attributes for the athlete through the frustration that accompanies the disrupted performances that the athlete experiences en route to a new, higher level of performance.