

[IMAGE]

Growing Bodies: Pediatric Musculoskeletal Injuries in Children

By Dr. Deborah Pate

Do you know that children's musculoskeletal systems are different than adults? That's because children's bones are continually growing. You might not think too much of that fact, but **Dr. Deborah Pate** explains why it's so important, particularly in terms of your child's risk of suffering an injury during athletic activity.

Physical activity is extremely important for everyone, but especially for children. A well-designed exercise program enhances their physical and intellectual development. Competitive sports are often a child's first introduction to programmed exercise, and in the past decade, there has been an increase in the number of children participating in team and solo sports. Younger children are allowed to participate in sports for enjoyment, health and personal development. This balance changes as competitive elements become more dominant and subsequently young athletes train harder and longer and practice a sport throughout the whole year. Consequently, with increased participation and increased physical demands have come increased sports-related injuries.

Growing Bone vs. Mature Bone

growing up - Copyright © Stock Photo / Register Mark Children's musculoskeletal systems are different from adults. To understand pediatric injuries that involve the musculoskeletal system, it's important to be aware of the differences between children and adults in this regard. The main difference is that children's bones are growing; adults' bones have stopped growing. This bone growth happens in two ways - by growing lengthwise and widthwise. The bone grows lengthwise in an area at the ends of the bones called the epiphyseal plate or growth plate, in the region known as the metaphysis. The widthwise growth occurs on the surface of the bone.

Growing bone has inherent areas of weakness due to the growth process. In fact, children's tendons and ligaments are relatively stronger than the growth plate; therefore, with severe trauma the growth plate will give way before the ligament. On the other hand, children's bones and muscles are more elastic and heal faster compared to adults.

Growing Bone Means Unique Injury Risks

Due to the differences in growing bone, the patterns of injuries are different from mature bone. There are two main types of bone injuries: one is an acute injury in which violent forces are applied at one time; the second is from chronic, recurring stresses applied to the bone over a prolonged period of time. Growth plate injuries can cause cessation (stoppage) of growth of the bone, resulting in limb-length discrepancy, angular deformity or altered joint mechanics; possibly causing permanent disabilities. The chronic recurring stresses are often termed *overuse syndromes*, but also include stress fractures which can lead to changes that affect the joints, causing early arthritic changes. Stress fractures, if not managed correctly, can result in complete fracture.

kid measuring height - Copyright â Stock Photo / Register Mark Adolescents who are in the peak period of linear growth - often termed a *growth spurt* - are most vulnerable because of imbalances in strength and flexibility and changes in the biomechanical properties of bone. Sports involving contact and jumping have the greatest injury risk. Most chiropractors who treat pediatric patients are aware of these injuries and the potential causes related to the growing musculoskeletal system. They have been uniquely trained to understand the musculoskeletal system, making them excellent resources for the management of sports-injuries.

Red Flags: Is Your Child at Risk for a Severe Injury?

There are particular conditions that preclude children from participating in contact sports; specifically children with developmental issues or handicaps (and who may even be involved in activities such as the Special Olympics). Children with disabilities should participate in sports if at all possible, but there are a few structural problems that should not be ignored. Children who have been diagnosed with Down syndrome, rheumatoid arthritis and upper cervical anomalies should be carefully evaluated. Down syndrome patients have a high incidence of atlanto-axial (cervical) instability - reportedly up to 30 percent. Children with rheumatoid arthritis are also at increased risk for spinal cord injury in contact sports because of an increased incidence of cervical (neck) instability.

The term *atlanto-axial* refers to the first two cervical vertebrae, also called C1 and C2, which are located at the base of the skull. The Special Olympics Committee recommends that participants with atlanto-axial instability be restricted from activities such as diving, gymnastics, high jump, the pentathlon, butterfly stroke, alpine skiing, soccer, and power lifting. Of course, contact sports like football, wrestling, and rugby

should also be avoided. This recommendation is not without some controversy, however, because people with this instability don't always demonstrate it initially, and even the reverse is true; some actually demonstrate the instability and later appear to grow out of it.

All children's cervical spines are relatively hypermobile (able to move beyond normal range of motion) because of ligamentous laxity (loose ligaments) and underdevelopment of the osseous structures. They also have relatively large heads and weaker neck muscles than adults compared to the rest of their bodies, which also predisposes them to neck injuries. But if your child has Down syndrome, rheumatoid arthritis or any upper cervical spine anomaly known to be associated with instability, they should be evaluated before participating in athletics.

How Your Chiropractor Can Help

To screen for atlanto-axial instability, X-rays of the cervical spine in flexion and extension are performed. They show the motion of the vertebrae and the anatomy as it relates to each adjacent level during motion. These images are very helpful in determining increased risk of ligamentous laxity.

The neurological manifestations of atlanto-axial instability include neck pain, problems with walking, decreased neck motion, muscle spasm and rigidity in the neck muscles, changes in coordination, hyper-reflexive reflexes to name the most common. If any of these symptoms are present, neurological injury is suspected and the child should be carefully evaluated. The work-up should also include an MRI of the cervical spine to rule out any damage to the spinal cord. This evaluation must be done prior to participation in *any* sports.

If you are uncertain whether or not your child has anomalies in their cervical spine, but they are experiencing any of the above symptoms or have been diagnosed with Down syndrome, rheumatoid arthritis, etc., it is best to have them evaluated - certainly before they participate in any type of athletics. The same is true if your child appears to be healthy, but is beginning to participate in organized sports, particularly sports that involve contact and/or require specific repetitive training (perhaps involving weight-lifting, etc.). Many chiropractors have X-ray facilities in their clinics and will be able to perform the necessary examination to determine spinal instability. They are a great resource for evaluating the spine and musculoskeletal disorders, as it is their specialty.

Stay-Safe Strategies: Reducing Youth Injury Risk

kid strong - Copyright â Stock Photo / Register Mark It's important to encourage your children to be active, but of course, with increased activity comes increased opportunity for injury. In addition to the observations and suggestions by Dr. Pate, here are some things to keep in mind if your child is interested in participating in athletics, courtesy of the National Institute of Arthritis and Musculoskeletal and Skin Diseases:

- Enroll your child in organized sports through schools, community clubs, and recreation areas that are properly maintained. Any organized team activity should demonstrate a commitment to injury prevention. Coaches should be trained in first aid and CPR, and should have a plan for responding to emergencies. Coaches should be well-versed in the proper use of equipment, and should enforce rules on equipment use.
- Organized sports programs may have adults on staff who are certified athletic trainers. These individuals are trained to prevent, recognize, and provide immediate care for athletic injuries.
- Make sure your child has and consistently uses proper gear for a particular sport. This may reduce the chances of being injured.
- Make warm-ups and cooldowns part of your child's routine before and after sports participation. Warm-up exercises, such as gentle stretching and light jogging, can help minimize the chance of muscle strain or other soft-tissue injury during sports. Warm-up exercises make the body's tissues warmer and more flexible. Cooldown exercises loosen muscles that have tightened during exercise.
- Learn and follow safety rules and suggestions for your child's particular sport.

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