LET'S TALK ABOUT

PELVIC APOPHYSEAL AVULSION INJURIES

A PATIENT GUIDE

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WHAT ARE AVULSION INJURIES?

Muscles attach to bones via a thick band of tissue called a tendon. In children, to allow for growth in length and shape the bones are made up of multiple growth plates called apophyses. During adolescence, these are still immature and largely made up of cartilaginous tissue not solid bone and therefore more vulnerable to injury, especially in muscles like the big thigh muscles like the hamstrings, quadriceps and adductor muscles where they attach to the pelvis.

In can be explained in terms of a climber attached to a wall by an anchor and a rope. The climber in the picture below could fall if either the anchor is pulled out of the wall or the rope snaps. In children the bone is not as strong as the tendon and it equates to the anchor coming away from the wall (an avulsion injury). In adults, the bone has fully ossified and the bone is stronger than the tendon and adults are therefore more likely to experience a tendon injury.

During puberty, boys experience a rapid growth spurt which creates longitudinal growth of the thigh bone placing greater traction on the muscles where they attach to the bone. They also experience a surge in hormones like testosterone which generate the ability to apply greater power and forces when kicking and jumping. When muscles contract forcefully during high velocity actions like kicking, jumping, sprinting and squatting, the force applied may exceed the capacity of the immature attachment on to the pelvis and cause an avulsion injury where a small portion of the bone which is attached to the tendon comes away from the parent bone. Prior to puberty, the muscles rarely have sufficient strength to cause an avulsion injury so these are rare in younger children and tend not to occur in the foot and knee.

In children, injuries to the growth plates are called fractures, so these injuries are often called avulsion fractures, but they are not like a traditional fracture in an arm or leg where the bone breaks.

AT THE PELVIS THERE IS A GREATER RISK OF AVULSION INJURIES IN YOUTH ATHLETES

In kids capacity of the tendon is greater than the bone. = the anchor pulls away from the wall

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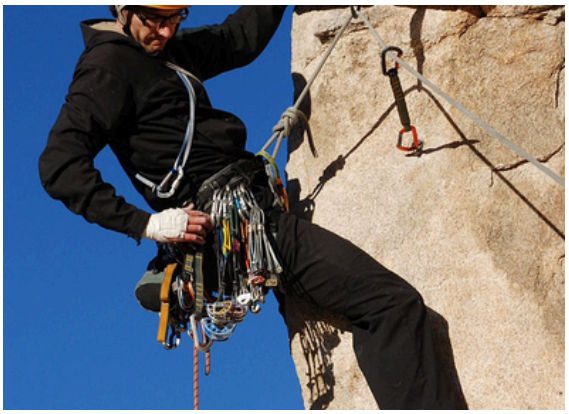
In adults, the capacity of the bone is greater than the tendon = the ropes frays or snaps



WHO GETS AVULSION INJURIES?

Avulsion injuries are more common in sporty children, especially boys who participate in repeated high intensity and higher volumes of kicking, deep squats, hopping, jumping and change of direction type activities.

The points of attachment of the thigh muscles on to the pelvic bones are not fully mature and robust until around the age of 18-23. Some children mature earlier than others and some muscles mature earlier than others so the window where these injuries occurs varies between individuals.

WHAT ARE THE SYMPTOMS OF AN AVULSION INJURY?

The pain is local to the attachment of the muscle. The onset of pain can be gradual or sudden. If the pain is sudden, severe and accompanied by a sensation of popping, it is a strong sign that the child may have an avulsion injury and should be checked by a health professional before playing sport again.

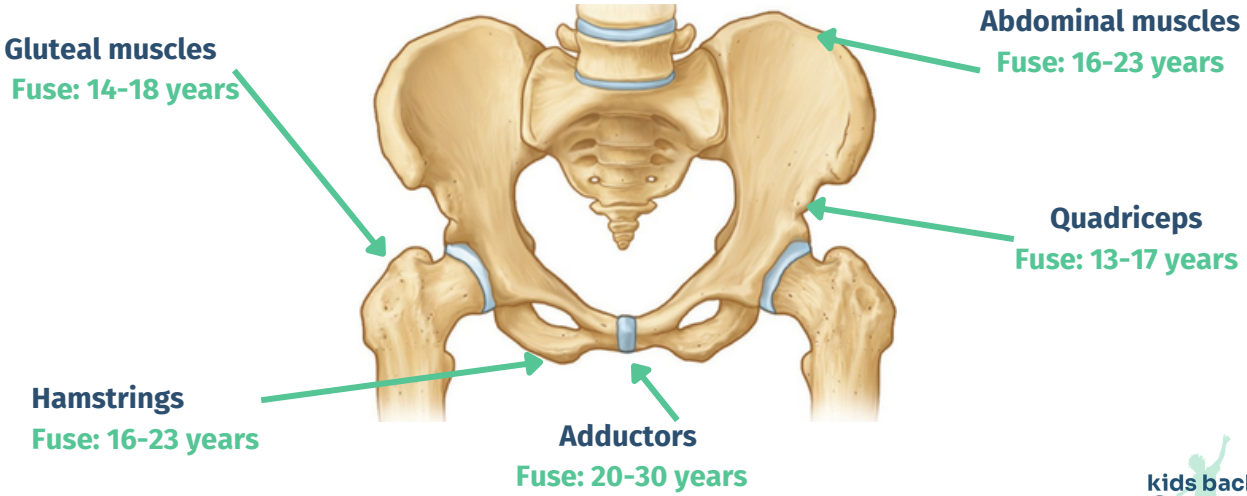
A SUDDEN ONSET OF PAIN WORSE ON ACTIVITY

PAIN ON KICKING, RUNNING, JUMPING, HOPPING

PAIN, SWELLING & TENDERNESS OVER THE BONY ATTACHMENT TO THE PELVIS

MAY BE ACCOMPANIED BY POPPING SENSATION & THEY MAY STRUGGLE TO WEIGHT BEAR

WHEN DO THE MUSCLE ATTACHMENTS FUSE & MATURE?



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References: Parvaresh KC et al (2016) Secondary ossification centre appearance and closure in the pelvis and proximal femur. J Pediatr Orthopaedic. 2016

HOW IS IT DIAGNOSED?

This injury needs to be diagnosed by a health professional who understands youth athlete development and when the growth tissue will be fully mature. However an X-ray is needed to assess the degree of separation between the parent bone and the avulsed segment of bone. Where possible, an MRI scan is more effective than an x-ray for picking up mild avulsion injuries and showing the potential for healing.

CAN I PLAY WITH PAIN?

It is important that the athlete does not return to sport without first completing a supervised rehabilitation programme often taking between 16-20 weeks depending on the extent of injury and which muscle is involved.

PROTECT:
The avulsion injury will be aggravated by activities such as running and kicking so in the early phases it is important to protect the injury from any further traction or stretching which might make the avulsion distance greater. If their pain is severe, the athlete may be put on crutches for the first few weeks until the pain subsides. it is important that the athlete stays fit and strong so they will be given exercises that protect the injured muscle but maintain overall strength.

After around 2-4 weeks the athlete will be pain free if they are following advice. If they are still experiencing pain it may be that they are still doing too much and need to do less activity until it settles.

REPAIR: Once the pain settles, the athlete will need encouragement not to resume potentially aggravating activities as the bone still takes approximately 12 weeks to heal. During this phase the athlete may be able to start to exercise in water, on a static bike and begin to do some gentle exercises with their injured muscle.

START TO MOVE: At this phase of rehabilitation the athlete will begin to add in movements like squats, lunges and movements required in their sport. The intensity will intially be low avoiding prolonged stretches. As the muscle attachment repairs, the volume and intensity of activity will increase in preparation for a return to training. Activities like hopping, running and skipping will be added gradually building up speed and agility.

RETURN TO TRAIN: Usually at around 12 weeks, depending on the injury and the level of fitness retained, the athlete can start to add in low impact elements of training, gradualllly adding more demanding activities. It should be remembered that the other children in the team will have been working hard in training and the level of fitness may be higher than before the player was injured. In addition all the children will have grown and this can mean that again the demands required for a return to sport may have shifted.

RETURN TO PLAY: Once the child has been able to train at full intensity for 2 weeks they can begin to reintroduce competitive sport. Start with short spells such as a 15 minute period, gradually building up greater pitch time until they are back at full fitness.

SURGERY: The vast majority of pelvic avulsion injuries will heal without surgical treatment, but occasionally the degree of separation in the avulsion injury may be too big to enable natural healing and the injury may require surgery to fixate the bone fragment. The rehabilitation will then follow a similar sequence outlined above.