A practical approach to apophysitis

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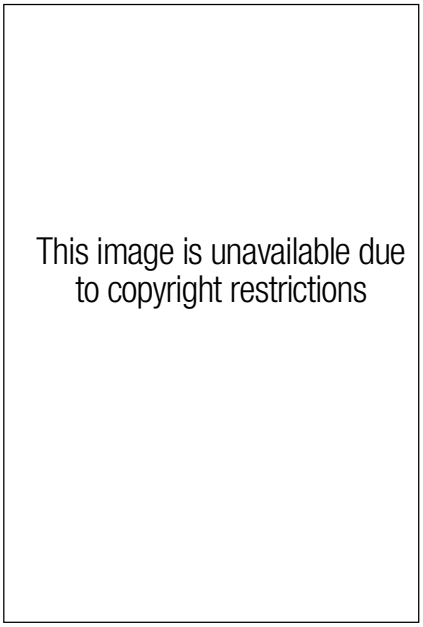
Apophysitis typically occurs between the ages of 12 and 15 years, especially during periods of rapid growth. With conservative management, the likelihood of a full recovery is excellent.



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Case presentation

A 13-year-old soccer player presents with a four-week history of aching anterior right knee pain that lasts about 24 hours following training and matches. There is no history of direct trauma, but he has experienced a significant growth spurt during the last six months. Clinical examination reveals swelling and tenderness over the tibial tuberosity, absence of a knee joint effusion, stable knee ligaments and no patellofemoral irritability. X-ray shows a normal tibial tuberosity, with overlying soft tissue swelling.

Comment

This presentation is highly suggestive of apophysitis of the tibial tuberosity (Osgood–Schlatter disease), a condition first described in 1903. It is the result of repetitive traction stress on the tibial tuberosity, due to the pull of the quadriceps muscle group acting via the patella tendon (Figure 1).

Tibial tuberosity apophysitis typically occurs in adolescents between the ages of 12 and 15 years, especially during periods of rapid growth. Pain of insidious onset is the usual presenting symptom, and patients are generally involved in sport. The condition is more common in boys than in girls, probably because of their higher

Table. Common types of apophysitis

Region	Site	Muscle group	Examples of provoking activities
Elbow	Medial epicondyle (little league elbow)	Forearm flexors	Throwing
	Olecranon	Triceps	Gymnastics
Pelvis	Anterior superior iliac spine	Sartorius	Sprinting
	Anterior inferior iliac spine	Rectus femoris	Soccer
	Ischial tuberosity	Hamstrings	Ballet, gymnastics
Knee	Tibial tuberosity (Osgood–Schlatter disease)	Quadriceps	All running sports, aggressive quadriceps stretching
	Inferior pole of the patella (Sinding-Larsen–Johansson disease)	Quadriceps	Jumping
Foot	Calcaneal apophysis (Sever's disease)	Calf complex	Soccer
	Base of the fifth metatarsal (Iselin's disease)	Peroneus brevis	Running, ballet

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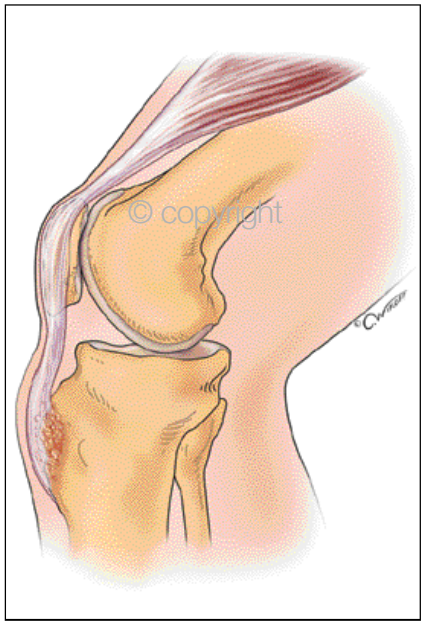
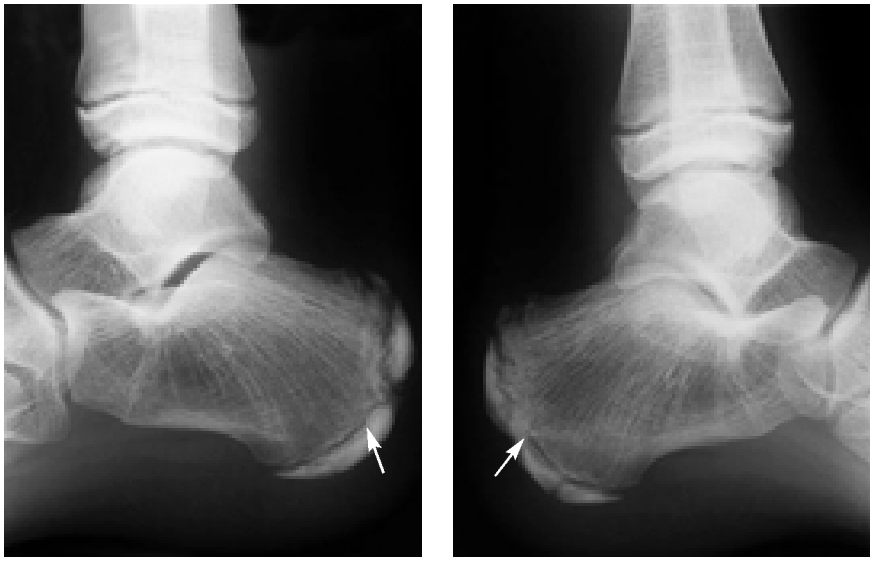


Figure 1. Tibial tuberosity apophysitis (Osgood–Schlatter disease) is the most common form of apophysitis and usually presents with local swelling, tenderness and activity related pain as the quadriceps muscle group pulls on the tibial tuberosity via the patella tendon.



Figures 2a (left) and b (right). X-rays showing bilateral calcaneal apophysitis (Sever's disease). Fragmentation and asymmetry are common even when the patient is asymptomatic.

activity level at this age. The pain is typically localised to the tibial tuberosity and aggravated by quadriceps loading activities, such as running, jumping and kicking, or by aggressive quadriceps stretching. It is bilateral in about 25% of cases.

General principles of apophysitis management

Management of the patient with apophysitis should include an explanation of the mechanism responsible for the pain, along with a warning that the pain may recur over the next two or three years but can be expected to resolve with growth plate closure at skeletal maturity. Additional appropriate advice includes:

- reduce pain with local application of ice following activity, simple analgesics or anti-inflammatory therapies (as required)
- modify the training load that precipitated the pain
- reduce load on the apophysis by resting from aggravating activities such as running, jumping, kicking or throwing and by offering biomechanical support with appropriate footwear, a heel raise or orthotics
- suggest soft tissue massage or release of tight muscle groups
- avoid vigorous stretching of the muscle group attaching to the apophysis
- establish a progressive muscle strengthening program
- ensure adequate follow up of running, jumping or throwing technique, where appropriate (it is useful for GPs to contact coaches to discuss a modified training and competition program).

Discussion

The apophysis is an accessory ossification centre that does not contribute to longitudinal growth. It is separated from the rest of the bone by a growth plate containing active, proliferating fibrocartilage cells.

Apophyseal injuries usually present during an adolescent growth spurt, when the growth plates are active and wide and the bone has lengthened at a faster rate than the muscle–tendon unit. Common types are described in the Table, and an example of calcaneal apophysitis is shown in Figures 2a and b. Traction forces are applied to the apophysis by muscle groups that are large and tight (e.g. the quadriceps or the gastrocnemius and soleus), acting via their tendinous attachment, during running, jumping, kicking or throwing. Repeated or excessive irritation and inadequate time for growth plate cell recovery results in the clinical entity known as apophysitis.

Diagnosis

Apophysitis is a clinical diagnosis. Imaging is not mandatory but is useful in patients with atypical, ongoing or increasing symptoms. Characteristic x-ray findings include

soft tissue swelling, fragmentation of the apophysis and widening of the growth plate. A normal x-ray does not exclude the possibility of apophysitis.

The astute clinician needs to consider that the presence of apophysitis at multiple sites may herald the presence of juvenile idiopathic arthritis and warrant further investigation.

Management

In clinical practice, it is useful to separate patients into two groups, based on their ability to continue exercise – 'not too sore' or 'too sore'. The principles of management listed in the box on page 64 apply to all patients with apophysitis.

'Not too sore'

Most patients with apophysitis fall into this group. They are likely to complain of pain that appears early in activity, warms up and aches for a short time afterwards. Their ability to play or perform is unaffected, and the aching pain typically resolves over about 24 hours. Patients in this group can continue normal activity.

'Too sore'

Patients in this group are likely to complain of pain that increases with activity and persists for days afterwards. They usually have obvious muscle wasting and are frustrated by pain-limited sport performance and inability to complete a training session or match.

Additional management for these patients includes:

- a four- to six-week period of rest from sport to allow the apophysitis to settle
- maintenance of fitness and team involvement while resting the injured body part, using nonimpact cross-training (e.g. swimming, water running or bike riding), skills training and modifying the training environment (e.g. using soft pit landings and reduced floor routines for gymnasts with calcaneal apophysitis)
- a gradual return to sport when the apophysis is no longer tender.

Prognosis

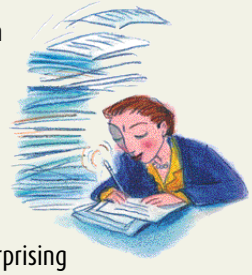
Relative rest and practical, conservative management offers an excellent likelihood of full recovery for patients with apophysitis. It is not unusual, however, for the pain to recur over a two- to three-year period. A minority of patients may complain of ongoing symptoms. These include prominence of the tibial tuberosity, which may cause pain with kneeling or affect the cosmetic appearance, and nonunion of the bony ossicle at this site, which may occasionally require surgical excision. MT

DECLARATION OF INTEREST: None.

Key points

- In children and adolescents, think apophysitis rather than tendonitis.
- Traction forces across the fibrocartilage growth plate are the usual mechanism of injury.
- Active adolescents experiencing a growth spurt are the most likely patients to present with apophysitis.
- Pain is usually insidious in onset, and prone to recurrence over two or three years.
- Apophysitis is a clinical diagnosis. Investigation is not mandatory but useful if symptoms are atypical, ongoing or increasing.
- Management is based on the intensity of pain and the extent to which normal activity is limited. Those who are 'not too sore' can be safely allowed to continue their sport. Those who are 'too sore' need a period of relative rest and pain-free crosstraining until all apophyseal tenderness resolves, followed by a gradual return to sport.
- Symptoms usually completely resolve when the growth plate closes with skeletal maturity.
- Patients with apophysitis have an excellent prognosis for full recovery.

Share your innocence



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