

# Chapter 2

## History



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### Introduction

Knee pain is a common reason for seeking medical attention, and in children and adolescents, joint pain is commonly caused by either acute or chronic injury. Between 1999 and 2008, 6.6 million youth with knee injuries presented to emergency rooms in the United States, and the two age groups with the highest incidence rates were older adolescents aged 15–24 and children aged 5–14 [1]. Knee injuries in children and adolescents may result from chronic, repetitive overuse or may be caused by an acute, often traumatic mechanism; occasionally, injuries may also result from a combination of acute and chronic factors. Historical details, such as the onset and nature of the pain, presence of associated symptoms, as well as elements from the past medical, family, and sport histories, can help illuminate the cause of knee pain.

### Description of Pain

Obtaining a comprehensive history of the knee pain is essential in focusing the differential diagnosis. Important characteristics of the pain include timing (onset and duration), location, nature, and severity of the pain, as well as the mechanism of injury. In terms of timing, onset of knee pain can be either acute or insidious. Traumatic injuries tend to be acute in onset, while overuse injuries tend to be insidious, occurring gradually over time. The clinician should attempt to quantify the duration of pain or, if intermittent, how long the episodes last (Table 2.1).

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**Table 2.1** Key elements of the medical history of knee pain

| History elements      | Characteristic                 | Examples                                             |
|-----------------------|--------------------------------|------------------------------------------------------|
| Pain description      | Timing:<br>Onset<br>Duration   | Acute, insidious                                     |
|                       | Location                       | Anterior, posterior, medial, lateral, etc.           |
|                       | Quality                        | Sharp, dull, achy, burning, etc.                     |
|                       | Severity                       | Mild, moderate, severe<br>VAS 0–10                   |
|                       | Aggravating/mitigating factors | Activity, rest, etc.                                 |
|                       | Attempted initial treatments   | Ice, medications, rehabilitation, etc.               |
| Associated symptoms   | Swelling/effusion              | Acute, large amount<br>Gradual onset                 |
|                       | Mechanical symptoms            | Popping/crepitus<br>Locking<br>Instability           |
|                       | Other                          | Erythema, warmth, nocturnal pain, etc.               |
| Past medical history  |                                | Prior knee pain<br>Prior knee surgery<br>Hip issues  |
| Family history        |                                | Autoimmune, musculoskeletal conditions               |
| Social/ sport history |                                | Sport, position<br>Amount/intensity of participation |

The exact location, or lack thereof, of the pain can be helpful in making the diagnosis. One should inquire whether the pain is anterior, posterior, medial, or lateral. Common etiologies of anterior knee pain include patellofemoral pain syndrome, patellar instability (subluxation, dislocation), Osgood–Schlatter or Sinding–Larsen–Johansson apophysitis, pre-patellar bursitis, and patellar tendinitis. Patellofemoral pain is often vague, poorly localized anterior knee pain, while Osgood–Schlatter, for example, localizes directly to the tibial tuberosity. Relatively common causes of posterior knee pain include muscle tendon injuries to the popliteus, hamstring, or calf muscles; ligamentous injuries to the posterior cruciate ligament (PCL); and meniscal injury [2]. Less common causes of posterior knee pain include popliteal cysts, nerve or artery entrapment, and multi-structural entities, such as posterolateral corner injuries. Medial and lateral knee pain can be commonly caused by injury to the medial collateral ligament (MCL) or lateral collateral ligament (LCL), respectively, or meniscal pathology. Distal iliotibial band pain also commonly localizes to the lateral knee. Fractures, growth plate (physeal) injuries, and soft-tissue contusions often occur just above or just below the knee joint itself.

Clinicians should inquire as to the quality and severity of the pain. Common descriptors of pain include sharp, dull, achy, throbbing, and burning. Rating severity can be as simple as mild, moderate, or severe, or more commonly a pain scale, such as the visual analog scale (VAS), may be employed. If the pain was acute and

activity-related, the clinician should ask whether the patient was able to bear weight and/or continue participating afterward or if the athlete was forced to stop the activity. Inability to bear weight or continue the activity should raise suspicion for a significant injury, such as a ligament rupture, growth plate or bone fracture, or unstable meniscal tear. Clinicians should also ask about factors that worsen or mitigate the pain, as well as any attempted treatments or therapies and their effectiveness.

In acute injuries, eliciting the precise mechanism of injury, if possible, is often invaluable in the diagnostic process. In addition to patient or witness description of the injury mechanism, video evidence, if available, can prove to be quite useful, as well. Many ligament injuries occur as a result of direct trauma to the knee, when the ipsilateral foot is planted. A direct blow to the lateral leg produces valgus stress and often results in an MCL sprain, while a direct blow to the medial knee conversely results in an injury to the LCL [3]. PCL injuries are classically caused by a posteriorly directed force to the proximal tibia, the so-called “dashboard injury,” due to the relatively high incidence seen in front seat passengers involved in motor vehicle accidents. Direct blows to the posterolateral or posteromedial knee in high-velocity sports, such as in football or rugby, can result in injuries to multiple structures, such as posterolateral corner injuries or the “unhappy triad” of MCL, ACL, and meniscal injury.

Acute injuries may also occur without direct trauma to the knee. Noncontact mechanisms can be important contributors to ligament and meniscal injuries. Sudden stops or changes in direction lead to deceleration moments and, when combined with valgus loading, may result in anterior cruciate ligament tears, especially in female athletes and skeletally immature children. Twisting or pivoting on a fixed foot can also result in meniscal injuries. In addition to the “dashboard mechanism,” PCL ruptures can also occur from hyperextension of the knee. Acute hyperextension can also produce ACL injuries, anterior tibial plateau contusions or fractures, and impingement of the anterior infra-patellar fat pad.

The lack of any trauma or obvious mechanism of injury in an acutely painful knee may also be a reason for concern. Consideration should be given to other potential etiologies, such as infection or autoimmune conditions. As biomechanics change with age and skeletal maturity, occasionally undiscovered structural issues, such as a discoid meniscus, may result in an acutely painful knee. Finally, prior injuries, such as a small meniscal tear or chondromalacia, may result in an acute-on-chronic picture as exacerbations of pain and swelling may occur secondary to use.

## Associated Symptoms

The presence of other symptoms in the knee joint, as well as more systemic symptoms, may help to narrow the differential diagnosis further. Important considerations for the knee include the presence or absence of swelling and mechanical symptoms.

Both the timing and quantity of joint swelling provide important clues. Rapid onset of a moderate-to-large amount of fluid within 1–2 hours after an incident often signifies the presence of blood in the joint (hemarthrosis). Hemorrhage into the joint typically occurs in conjunction with a significant injury to bone (contusion or fracture) and/or disruption of a major ligament, such as the ACL or patellofemoral ligament (i.e. a patellar dislocation). Slower onset, over the course of 24–48 hours, of a small-to-moderate amount of fluid is more consistent with a meniscal or cartilage injury or a less severe ligament sprain. With recurrent effusions, clinicians may consider meniscal, chondral, or autoimmune etiologies.

Medical providers should inquire about the presence of mechanical symptoms, such as popping, locking, or instability. Patients often complain about painless popping or cracking in joints, including the knee. Fortunately, most intra-articular crepitus is benign and does not indicate major structural pathology; however, popping that is painful or is accompanied by an effusion should be investigated more cautiously. Additionally, many cases of popping around the knee joint are extra-articular in origin, especially in younger patients. Movement of the distal iliotibial band as it approaches its insertion on Gerdy's tubercle can cause popping and occasionally mild localized swelling. A symptomatic medial plica (synovial fold) can also cause local pain, swelling, and popping near the anteromedial joint line. Both are fairly benign conditions and are relatively easily managed.

It is important for the clinician to differentiate the type of benign crepitus noted above from true mechanical locking, as patients may use the terms interchangeably. Mechanical locking indicates a mechanical block to extension, or less commonly flexion, of the knee, due to the abnormal interposition of a structure, such as a loose body or unstable meniscal flap, between the tibial plateau and the femoral condyle. This locking is not only painful but also potentially dangerous for the patient and should be treated in an expeditious manner.

Another common point of confusion related to symptom terminology is “giving way” versus true, mechanical instability. Mechanical instability refers to a structural deficiency in the knee, resulting in true instability of the joint. Frequent causes of true mechanical instability are an ACL rupture or patellar dislocation; however, more frequently, many patients complain of their knee “feeling like it's going to give out” but lack any intra-articular, structural abnormality. Often the cause of their insecurity is actually arthrogenic muscle inhibition (AMI), or failure of activation of the quadriceps muscle. This essentially represents a pain reflex and commonly occurs in patients recovering from ACL reconstruction or other knee surgeries but is also seen in patients with anterior knee pain, such as patellofemoral syndrome and patellar tendinitis [4]. One helpful means of clinically differentiating these two entities may be to inquire about the context of the sensation; while AMI typically occurs when navigating stairs or standing from a seated position, true ligamentous instability often occurs when stopping suddenly or changing directions and is often accompanied by a sense of movement within the joint.

Patients may experience additional symptoms in the knee or elsewhere in the body. The presence of erythema, warmth, and significant pain in the joint should alert the provider to the possibility of infection, such as septic arthritis, or other

acute arthropathy (i.e. gout, pseudogout, gonococcal disease, etc.). Nighttime pain, in addition to constitutional symptoms, such as weight loss, night sweats, and fatigue, might indicate neoplasia. Other possible symptoms seen with malignancy could include fever, anorexia, and general malaise. The presence of swelling, pain, or erythema in other joints likely indicates a more systemic, autoimmune process, such as systemic lupus erythematosus, rheumatoid arthritis, or juvenile idiopathic arthritis; often these conditions have other extra-articular manifestations, as well, such as rashes, gastrointestinal bleeding, and ocular changes.

## **Past Medical History and Family History**

Patients should be asked about their own medical history as it relates to the knee. A prior history of knee pain or swelling or previous knee surgeries is important to note. One should always ask about issues in the contralateral knee; athletes who have had an ACL reconstruction in one knee are at higher risk to suffer an ACL injury in the contralateral knee [5]. Additionally, prior or concurrent issues in the hips may directly cause or contribute to pain in the knee and should be noted.

In terms of family history, one should inquire about the existence of first-degree relatives with autoimmune conditions. Even some conditions, like pes planus and genu valgum, may have hereditary causes, and a detailed family history may illuminate these possibilities.

## **Social and Sport History**

An understanding of an athlete's sport and his or her level of play is advantageous, when attempting to evaluate knee pain or injury. For example, in high school females, the highest risk sports for ACL rupture are soccer, basketball, softball, and volleyball. For high school males, the highest risk sport is football [6]. Some evidence exists that even certain positions or styles of play may cause a higher risk than others. For example, defending in soccer is associated with a higher risk of ACL rupture, especially in females [7].

Level of play is also important to understand. It is not uncommon now to have young athletes involved in one sport year-round, on multiple teams. The almost constant, repetitive load on their bodies can lead to overuse injuries involving primary growth plates, apophyses, tendons, and bone. A recent study in pediatric athletes demonstrated that single-sport specialized athletes in individual sports report higher training volumes and greater rates of overuse injuries than single-sport specialized athletes in team sports [8]. Abrupt changes in training, especially significant increases in intensity or duration of play over a short period of time, or sudden alterations in footwear or playing surface can also be precipitants for injury [9]. Inquiring about level and intensity of play, including number of hours per week and

weeks per year, and any sudden changes in training may provide clues as to the degree of risk for overuse injury and may allow for providing enhanced guidance on injury prevention.

## Chapter Summary

Young patients may have difficulty describing their presenting complaint, and the task of obtaining a detailed description of knee pain can be challenging for the provider. By utilizing a standard approach with respect to documenting the history of the complaint, clinicians can avoid missing crucial details that may provide clues to the diagnosis. The history should concentrate on key characteristics of the pain, the mechanism of injury in cases of acute complaints, the presence or absence of any associated symptoms, pertinent details of the patient's past medical history, the family history, and sport participation. Constructing a comprehensive, detailed history of the knee pain will allow the clinician to narrow their differential diagnosis and focus their physical exam.

## References

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