Because we communicate mainly through words, it is important that terms be understood in the same manner by all readers. Unfortunately, the study of the patellofemoral joint is complicated by the use of expressions that hold different meanings for different readers. Ideally, the community of musculoskeletal physicians should agree on a single definition of terms, but until then, authors and speakers should define their terms clearly. Some terms, such as chondromalacia and patellofemoral syndrome, should be abandoned altogether. I propose a glossary of confusing terms pertaining to the patellofemoral joint, the various interpretations of these terms, and possible resolutions of these conflicts. Words and terms included in this review include chondromalacia, patellofemoral syndrome, anterior knee pain, subluxation, malalignment, proximal realignment, Roux procedure, and “normal.”

In the Bible it is said that the men of Babel (Babylon) decided to build a tower all the way to the heavens. On seeing this, God said: “Come, let us go down, and there confuse their language, that they may not understand one another’s speech” (Genesis 11:1–9). God scattered the people across the earth so that no longer did everyone speak a common language. The men were no longer able to communicate, and the building of the tower was stopped.

The famous Tower (Fig 1) may well have existed: German archeologists working from 1899 to 1917 identified the remains of a tower south of Baghdad that they calculated to have been 300 feet (approximately 100 m) tall.29 Orthopaedists looking to build their own foundation for understanding, education, and research equally will be thwarted unless they begin to speak the same language, i.e., use the same terms in the same ways. Unfortunately, mainly for historical reasons, the study of the patellofemoral joint is complicated by the use of expressions that hold many different meanings.

Take the following sentences as an example: “Mrs. MJ suffered from instability and chondromalacia. Her symptoms persisted despite a proximal realignment, and she successfully underwent a Roux procedure.” Variations on such a statement routinely are found in doctors’ notes and commonly are spotted in the orthopaedic literature. However, the words “instability,” “chondromalacia,” “proximal realignment,” and “Roux procedure” have variable definitions, and different readers will attach vastly different interpretations to this seemingly straightforward sentence.

Ideally, the community of orthopaedic physicians should agree on a single definition of terms, and, indeed, such an attempt has been made.20,24 Similar attempts have been made with terminology pertaining to the wrist.15 Some terms, such as chondromalacia, patellofemoral syndrome, and anterior knee pain should be abandoned outright, and authors and speakers should clearly define their understanding, of the other ambiguous terms.

I will review a glossary of the confusing terms pertaining to the patellofemoral joint (Table 1), the history of these terms, their various interpretations, and a possible resolution of these conflicts.

Chondromalacia

Current interpretations of the word chondromalacia include: anterior knee pain,6,7,9,14,27,28,44,48 a cartilage lesion of the patella,1,2,31,37,42 a cartilage lesion anywhere in the knee,26 and a cartilage lesion anywhere in the body.3,10,36 The term has even caught on outside the traditional medical community.47 Unfortunately, the term is as ambiguous and potentially misleading as it is prevalent.

The following case history illustrates the risks of using terms such as chondromalacia that hold multiple meanings: AL is a 34-year-old woman who sustained a deep osteochondral injury of her medial femoral condyle when
her knee struck a hard object. Her referring orthopaedist applied the diagnosis of "Grade IV chondromalacia." On reviewing her records, the insurance doctor discovered that as a teenager she had been diagnosed by an orthopaedist as having "chondromalacia." The doctor therefore disingenuously but successfully suggested that the patient suffered from a pre-existing condition, and her insurance benefits were terminated.

To an orthopaedic surgeon the above scenario seems preposterous because it is obvious that the two doctors used the word chondromalacia in two different contexts. Nevertheless, this was a real-life scenario. The entire confusion would have been avoided had both orthopaedists applied more specific terms. For example, the first orthopaedist may well have been justified in attributing her pain to the more specific diagnosis of rotational malalignment because the patient did exhibit considerable patellar tilt and sclerosis under the lateral border of the patella. As for the second orthopaedist, use of the term "traumatic cartilage lesion" or an equivalent thereof would have been more accurate.

The term chondromalacia is an abbreviation of chondral malacia, meaning soft cartilage. The concept of soft cartilage as a pathologic entity dates back to the early twentieth century, when it was speculated that trauma-induced patellar cartilage lesions accounted for anterior knee pain. For much of the twentieth century, the term chondromalacia therefore was synonymous with anterior knee pain, the premise being that patients with anterior knee pain probably suffer from ulcerations of abnormally soft patellar cartilage. A number of findings that contradict that premise should have made the term chondromalacia disappear long ago. First, it has been recognized for many years that the articular cartilage of the patella is the thickest and softest in the human body. Soft patellar cartilage is, therefore, usual. Moreover, it has been established by more than one investigator that no correlation exists between a chondral lesion of the patella and pain unless the lesion reaches bone and is extensive. Even extensive arthritic lesions are felt by some to be asymptomatic, although this hypothesis remains controversial. The causes of anterior knee pain actually are many, and using the term chondromalacia for all of them is inaccurate and confusing.

If a patient suffers from anterior knee pain, it is the orthopaedist’s responsibility to establish a specific diagnosis, to the extent that this is possible. There exist many classifications from which a clinician can choose a tentative diagnosis.

Patellar Subluxation

The term subluxation can refer to either a radiographic sign, a finding on the physical examination, or a patient’s symptoms.

Radiographic subluxation refers to abnormal mediolateral displacement of the patella relative to the trochlea, as reflected by an abnormal congruence angle or similar parameter measured on an axial roentgenogram.

The articular cartilage of the patella is unique in that it does not follow the bony contour of the patella. Accordingly, the cartilaginous apex of the patella may not match the bony apex, being slightly medial or lateral to the bony apex, depending on the patient. Therefore, special care must be taken before determining that the position of the patella is abnormal. Conversely, although a laterali zed patella on magnetic resonance imaging (MRI) has been considered by some to be normal, a study of 60 patients without patellar pain and anatomically normal knees were imaged at or near extension. Their patellae were found to be centered over the trochlea on MRI. Therefore, any medial or lateral displacement of the patella on routine MRI can be considered a radiographic subluxation. The term “displacement” (medial or lateral), is preferable to “subluxation” in this radiographic setting.
Subluxation on the physical examination consists of being able to displace the patella to an excessive extent. Because there are substantial differences in constitutional laxity, it is difficult to quantify this specifically, although efforts continue in that direction.\textsuperscript{13,45} Certainly, greater displacement of one patella compared with the other qualifies as subluxation, especially if the looser side is painful when the patella is displaced.

Finally, subluxation can refer to a patient’s feeling of giving way as the patella slips out and then spontaneously back into the trochlea.

Otherwise excellent articles have been written on the treatment of subluxation without the authors having clarified which of the three meanings they intended or what their inclusion criteria were.\textsuperscript{8} It is obviously critical for speakers and authors to define their understanding of the term subluxation wherever and whenever it is used.

**Patellar Luxation**

This is a European term for dislocation. Subluxation (clinically, a lesser version of a luxation) flows naturally from the word luxation.

**Patellar Instability**

Instability is a clinical sign that can refer to subluxation (the clinical symptom) and/or dislocation.

**Malalignment**

Patellar malalignment is the abnormal positioning of the patella in any plane.\textsuperscript{17} The most common form of malalignment is rotational malalignment, whereby the patella is tilted, lateral side down.\textsuperscript{19} Patella alta and infera (baja) also technically are forms of malalignment; however, in the orthopaedic vernacular, malalignment does not refer to abnormal patellar height. On the other hand, abnormal positioning of the tibial tuberosity is included in the malalignment category. This is because a lateralized tibial tuberosity (increased Q angle) leads to a lateral force vector on the patella with the ensuing potential for pain and/or lateral displacement.

**Maltracking**

A maltracking patella is abnormally positioned at one or more points in the flexion-extension cycle. A J sign is the
penultimate example of maltracking: the patella is normally positioned as the knee extends from a flexed position, up until the last few degrees of extension, at which point it slips laterally. The course of the patella resembles the letter J. As the knee goes from an extended position to slight flexion, the patella then jumps medially back into the trochlear groove.39

A patella that rides along the lateral femoral condyle as the knee flexes and extends would be another example of maltracking. This can result from any combination of an increased Q angle, a tight lateral retinaculum, a dysplastic trochlea and internal rotation of the distal femur.

Incongruence

The term incongruence is used to describe a physical mismatch between the patella and the trochlear groove. If the term is going to be used with any anatomical accuracy, the clinician should first consider the following: the patella is always incongruous in the sagittal plane. Indeed, only a fraction of the patella is in contact with the trochlea, a fraction that varies in size and location as the knee bends and straightens. In the axial plane, much of the patellar articular surface is in contact with the trochlea, but the specific extent of the contact depends on the degree of flexion and the amount of loading. In the absence of loading, the cartilaginous apex of the patella may not be in contact with the trochlea.

As noted above in the section on subluxation, the apex of the patellar cartilage does not always coincide with the bony apex. Therefore, what might seem to be slight abnormal displacement of the patella may in fact correspond to a perfectly congruent patella (in the axial plane). True articular incongruence in the axial plane leads to excessive pressures on one side of the patella and hypopressure on the other. Merchant et al34 and then Aglietti et al1 have defined congruence on an axial radiograph taken at 45° of flexion.

Grade I, II, and III Chondromalacia

As discussed previously, the term chondromalacia itself can lead to confusion and should be replaced in this context with “chondral lesion.” Furthermore, whereas Grade IV changes are recognized universally as implying cartilage wear down to exposed bone, Grades I through III are more nebulous. Numerous grading classifications have been published based on the size, depth, qualitative appearance, and/or histology of the lesion.4,5,7,30,38 The clinician is best advised simply to describe the lesion with regard to location, appearance and size. For example: “The cartilage of the superior lateral aspect of the patella was noted to have a crabmeat appearance and the distal lateral cartilage revealed coarse fibrillations.” It is important to remember that the articular cartilage of the normal patella is the thickest and softest in the human body.35 Therefore, an element of softness is normal.

Patellofemoral Syndrome, Anterior Knee Pain Syndrome

These commonly used terms are not diagnoses. They represent medical double talk that parrots back to the patient, in pseudo-medical terms, what the patient complained of in layman’s terms. An analogy can be made with the patient who describes pain between his ears and is diagnosed with “headache syndrome” by the neurologist.

A syndrome is a condition characterized by a set of signs and symptoms. There is no such set of signs and symptoms in the “patellofemoral syndrome” because the term merely is a large tent covering a multitude of conditions, including overuse, tightness about the knee, malalignment, plicae, synovitis, neuromas, referred pain, to name but a few.18,23

“Anterior knee pain” is likewise not a diagnosis any more than “antero shoulder pain” or “volar wrist pain” would be.

Using the classification scheme of his or her choice, the clinician must to the extent possible try to identify a specific cause for the patient’s knee pain since not all anterior knee pain will be treated the same. Anterior knee pain caused by a tight iliotibial band, for example, will be treated differently from “patellofemoral syndrome” caused by overuse, a neuroma, patellofemoral arthritis, or referred pain from the hip.

Proximal Realignment

The term “proximal realignment” refers to soft tissue operations done on either side of the patella, such as a medial plication, advancement of the vastus medialis obliquus (VMO), and reconstruction of the medial patellofemoral ligament (MPFL). It is used in contra-distinction to the term “distal realignment” that describes procedures that displace the patellar tendon or most commonly the tibial tuberosity.

The term proximal realignment sometimes includes the lateral retinacular release, and sometimes does not. This comes from the fact that the lateral release can be done through a small incision whereas the traditional soft tissue procedures on the medial side of the patella are done with longer incisions. The implication is that the lateral retinacular release is a small procedure and the medial operations are large procedures. The distinction now is blurred by the fact that all incisions have become shorter and by the fact that the lateral retinacular release is associated with complications at least as substantial as the medial procedures. Medial plications now can be done arthro-
scopicallly as can the lateral retinacular release. Because the lateral retinacular release is no more or less a realignment than a medial plication, it is logical to include it under the umbrella of “proximal realignment” surgeries. Because this practice is not universal, authors should specify their inclusion and exclusion criteria for proximal realignment surgery.

**Patella Baja and Infera**

These two terms are well understood by orthopaedists but deserve a short linguistic discussion. They refer to the opposite of patella alta in describing a patella that is lying “low,” that is, too far distally relative to the underlying trochlea. The term “alta” means high in Latin and Spanish, but it is undoubtedly the Latin that inspired the term because Latin and Greek are common sources of anatomic terms. Baja, however, is Spanish for low, a nod to the California Baja that lies in close proximity to Los Angeles, home of M. Blazina, MD, who popularized the term patella baja (personal communication, Alan Merchant, MD). Linguistic consistency, however, would dictate that we use the term patella infera, occasionally, but incorrectly, written infra.

**Normal**

The term “normal” is commonly applied to test results (as in “the position of the patella is normal”25), but a specific definition of normal remains elusive.

There exist at least three definitions of the word normal:

1) When dealing with a series of measurements that exhibit a Gaussian distribution, a “normal” measurement falls within two standard deviations of the mean.

2) Normal can mean common. For example, “it is normal for an older person to develop an element of osteoporosis or diet-controlled diabetes,” or “it is normal in every school to find children with flat feet.”

3) The term normal is applied in medicine to conditions that do not lead to pain, deformity, disability or death.

Therefore flat feet are normal in the “common” sense of the term, but are not normal in the medical sense, since they predispose to pain. Likewise, radiologists often refer to a laterally positioned patella on magnetic resonance imaging as normal because they see this not uncommonly, but from a medical point of view a laterally positioned patella is arguably abnormal.

**The Roux Procedure**

César Roux in Switzerland was one of the first surgeons to describe a realignment operation for the patella.80,81 Without specifically referring to the term Q angle, he recognized that the point at which the patellar tendon is anchored influences the tracking of the patella and its tendency to displace laterally. He therefore displaced the patellar tendon medially in patients whose patella dislocated. Years later, in the United States, Goldthwait16 described an operation in which the lateral aspect of the patella was detached from its insertion, passed under the remainder of the patellar tendon, and fixed to the tibia, medial to the tibial tuberosity. In the United States this has come to be called the Roux-Goldthwait procedure. In Europe, the Roux procedure refers to a medial transfer of the patellar tendon, whereas in the United States the term “Roux operation” would conjure up the Roux-Goldthwait operation. Clearly, investigators must specify which they are referring to.22

**DISCUSSION**

Throughout the world of medicine, terms exist that seem archaic in the harsh light of today’s knowledge. The term “antibiotic” seems quaint and “erythematous” sounds pedantic to the twenty-first-century ear, but their meaning is clear to all and their use is harmless.

Chondromalacia, on the other hand, is quaint, confusing, potentially misleading, and based on an erroneous premise. Moreover, it has taken on a life of its own and has come to have at least five different meanings attached to any joint in any animal form that contains cartilage. It seems to me that the term should be abandoned altogether because each meaning of the word chondromalacia has a more specific, unambiguous term.

The terms “patellofemoral syndrome” and “anterior knee pain” are at least limited to the knee, but they encompass such a large constellation of conditions that they are useless as diagnoses. It is my opinion that they also should be abandoned in favor of diagnoses that come closer to explaining a patient’s pain.

Other common terms that pertain to the patellofemoral joint—such as subluxation, malalignment, proximal realignment, and well-named surgical procedures—remain useful, but may hold an entirely different meaning for the author than for the reader.

Until a day comes when the community of orthopaedic physicians agrees on a single set of definitions, it is critical for authors and speakers to clearly spell out the meanings that they attach to these words and phrases, lest they be accused of “babble.”

**References**


