A Case of SONK: Can Medical Therapy Make a Difference?

By Janet Markland, MD, FRCPC

What is SONK?
Spontaneous osteonecrosis of the knee (SONK) is the result of vascular arterial insufficiency to the medial femoral condyle of the knee resulting in necrosis and destruction of bone. First described in 1968, SONK most frequently affects women 50 years of age and older (3 women:1 man). Upon examination, patients with SONK present with severe pain in the knee that is sudden in onset and increases with weight bearing, including rising from a chair or ascending stairs. These patients often relay a history of pain with worsening at night.

It should be noted that SONK is actually believed to be a misnomer and that an increased number of investigations suggest that few of the reported SONK cases actually have necrosis under microscopic examination. Instead, most present with microfractures of osteoporotic bone. In these cases, all patients have unilateral involvement of the medial compartment of the knee.

Diagnosis: SONK and Secondary Osteonecrosis
Upon diagnosis, the patient in the case study should be questioned for previous trauma; the use of steroids, alcohol and/or tobacco; and blood disorders, including sickle-cell disease (SCD), hyperlipidemia, systemic lupus erythematosus (SLE), thrombosis predisposition or Gaucher’s disease, as these are risk factors for secondary osteonecrosis (frequently associated with bilateral involvement, as well as medial and lateral compartment involvement). Patients with secondary osteonecrosis present with long standing and non-localized insidious pain, and have underlying disorders, such as SLE. Though poorly understood, it is believed the condition itself is caused by a microvascular...
disruption in the subchondral bone leading to ischemia resulting from marrow fat cell hypertrophy or fat emboli, coagulopathies and thrombus formation.

SONK Imaging: MRIs and Radiographs
If plain radiographs are done early in the course of the disease, they are commonly “normal,” but should include anteroposterior, lateral and tunnel views. Although MRIs are frequently requested and may show changes when plain radiographs are normal, they may also be used to describe the extent of the abnormality.

The sensitivity and specificity of MRI (98%) is also useful for early confirmation. For example, in MRIs, T1-weighted images show discrete areas of low intensity, replacing the normal high intensity of marrow fat, whereas T2-weighted images show edema within an area of low signal intensity surrounded by high-intensity signal. Of note, bone scans are rarely used at present, and may show increased uptake on the medial femoral condyle.

When scanned, the different SONK stages present with the following:
- Stage 1: plain radiographs are normal and diagnosis is made by MRI;
- Stage 2: MRI scans show a flattening of the medial condyle;
- Stage 3: radiolucent areas surrounded by sclerosis are seen on the radiographs; and
- Stage 4: radiographs show a more defined sclerosis and subchondral bone collapse forming a calcified fragment or sequestrum (Figure 1).

Of note, conservative measures are not adequate and the patient will require a surgical approach if radiographs show the following:
- a defined ring of sclerosis and subchondral bone collapse (Stage IV);
- tibial subchondral sclerosis or medial joint space narrowing; or

Figure 1
Stage 4 SONK with > 50% of medial compartment involvement.
• osteophyte formation (Stage V) changes.

At present, joint fluid analysis appears useful at research labs only where high performance liquid chromatography of chondroitin 6-sulfate and hyaluronic acid can be measured and used in combination prognostically with MRI.

Treatment Options
About 40% of patients with SONK can be managed conservatively. Symptomatic treatments include protected weightbearing with crutches, analgesics, non-steroidal inflammatory drugs (NSAIDs) and physiotherapy to strengthen quadriceps and hamstrings. It is best to work hand-in-hand with an orthopedic surgeon. In the past, these surgeons have tried arthroscopic debridement with minimal success.

Other approaches that have been tried include osteochondral autographs and high tibial osteotomy, neither of which seem to be done in Canada. Unilateral arthroplasty is useful in patients who remain symptomatic after conservative measures and with a lesion of < 3.5cm. A total knee replacement (TKR) is recommended in the patient with a higher stage of SONK, but the results are not as good as TKR for other diagnoses. Continuing on, core decompression continues to show moderate-to-good results in less severe cases, as well as in young patients. When considering these various approaches, the operator’s experience, the patient’s age and other health risk factors must be taken into account.

Conclusions
With treatment, the patient in the case study presented did well two years after the onset of her symptoms (Figure 2). She lost 10 lbs., continues to walk regularly and bikes to work in the summer. However, some maneuvers continue to irritate her knee, including deep knee bending.

SONK is frequently associated with meniscal tears and sets the stage for degeneration. Although it is being recognized more frequently, SONK is still commonly mistaken for primary osteoarthritis, osteochondritis dissecans, meniscal tear, transient osteopenia of the knee or, less often, pes anserine bursitis. When treating a patient with SONK, in addition to the patient’s pharmacotherapy, which may include Tylenol or anti-inflammatories, I recommend a vitamin D supplement (1,000 to 2,000 μg) and Omega-3 (1.5 g). The future of early SONK repair, however, may lie in stem cell implants.

References:

Dr. Janet Markland is a Clinical Professor at the University of Saskatchewan and the Royal University Hospital, as well as a member of staff at St-Paul’s Hospital and a visiting consultant at the Saskatoon City Hospital in Saskatoon, Saskatchewan.

Sponsored by an unrestricted educational grant from Pfizer Canada.

Working together for a healthier world™