Osteolysis was initially reported in knee implants as bone resorption associated with uncemented implants. Later, it was realized that this could also occur in cemented implants. Small particulate debris stimulates a foreign body cellular response, leading to periprosthetic osteolysis. These particles can be of polyethylene (PE), cement (polymethyl methacrylate), and metal. Polyethylene wear is associated with osteolysis, which is a major challenge and limitation of the success of knee arthroplasty. This case shows a rare but severe long-term complication of PE wear—paresis of the peroneal nerve due to PE wear that resulted in not only osteolysis and loosening of the implant but also a giant ganglion that led to chronic pressure on the peroneal nerve.

**Case Report**

An 84-year-old man reported local knee pain lasting for several months. A total knee replacement had been performed 18 years earlier. Regular checkups had not happened for the past 8 years. He presented to the hospital because of increasing knee pain, weakness in the foot and instability when walking, and swelling around the knee and the calf.

Clinical examination showed swelling of the left lower leg. The left foot could not actively dorsiflex (grade 2 on the Medical Research Council Scale for Muscle Paresis of the Peroneal Nerve: A Rare But Severe Long-term Complication of Polyethylene Wear in Knee Arthroplasty

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**abstract**

One of the most important limiting factors in the long-term success of total knee arthroplasty is polyethylene wear. Particles of the polyethylene inserts have been shown to elicit a foreign body response, which produces bone resorption and osteolysis, ultimately leading to loosening and component failure. The authors report on a case of an elderly patient who underwent a total knee arthroplasty almost 2 decades ago. Clinical and radiological checkups of the knee had not been performed recently. He now presented with a painful and swollen knee, recurrent joint effusion and swelling of the lower leg, and paresis of the peroneal nerve. Radiological examination showed asymmetric wear of the polyethylene insert and pronounced periprosthetic osteolysis of the proximal tibia and the distal femur. Furthermore, a large ganglion on the anterolateral aspect of the lower leg, resulting in pressure on the peroneal nerve, was detected on ultrasound examination. Open excision of the ganglion was performed initially, followed by 1-stage revision knee arthroplasty using a modular system a few weeks later. This case shows a rare but severe long-term complication of total knee arthroplasty and highlights the importance of regular clinical and radiological checkups after total joint replacements, even for asymptomatic patients and especially in the long term (ie, beyond 10 years after implantation). The current case shows that wear of the polyethylene insert may also lead to ganglion formation that causes paresis of the peroneal nerve. [Orthopedics. 2017; 40(3):e538-e540.]

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Strength), and there was a steppage gait (foot drop gait). The radiograph of the left knee joint showed osteolysis around the tibial and femoral components and significant wear of the PE insert (Figure 1). Sonography showed a large, 7×10-cm ganglion on the lateral side, originating from the knee joint. The neurological examination confirmed the complete paresis of the peroneal nerve.

Open excision of the ganglion was performed (Figure 2). The ganglion was surrounded by a connective tissue membrane and filled with serous fluid, which was confirmed by histopathological examination. Microbiological test results were negative. Postoperatively, the foot was fixed in a peroneal splint.

A 1-stage revision knee arthroplasty using a modular system was performed a few weeks later. The wear of the insert was clearly visible; the lateral side was completely eroded.

Mobilization was performed on crutches using a flexible peroneal splint (Video). The neurophysiological follow-up weeks later showed signs of reinnervation of the tibialis anterior muscle.

**DISCUSSION**

One of the most important limiting factors in the long-term success of total knee arthroplasty (TKA) is PE wear.\(^3\)\(^-\)\(^{11}\) Particles of the ultra-high-molecular-weight PE tibial inserts have been shown to elicit a foreign body response, leading to the production of mediators of inflammation, which in turn produce bone resorption and osteolysis.\(^12\)\(^,\)\(^{13}\) Osteolysis ultimately leads to loosening and component failure.\(^14\) Multiple modes of wear and damage of artificial bearing surfaces used in TKA have been described in the literature.\(^15\) The severity of wear has been associated with a combination of factors inherent to the device itself, such as design, manufacturing process, PE thickness and size, sterilization process, and shelf life.\(^16\)\(^,\)\(^{17}\) Patient characteristics, such as young age, weight, and activity level, as well as surgical factors, such as cement use, prosthesis alignment, and soft tissue balance, have been shown to influence the degree of wear of PE total hip components.\(^18\)\(^,\)\(^{19}\) In contrast to total hip arthroplasties, in which wear can be accurately measured radiographically, a method of radiographically determining wear in TKAs does not exist. Studies on PE wear in TKA have been limited mostly to implants retrieved at revision surgery.\(^4\)\(^,\)\(^7\)\(^,\)\(^9\)
In one study, the correlation among activity level, length of implantation, and wear in TKA in PE inserts retrieved at autopsy was assessed. The results showed that length of implantation was the most important predictor of linear and volumetric wear rates in autopsy-retrieved implants. In addition to bone resorption and osteolysis with subsequent loosening and component failure, other complications may occur and should be considered.

Tan et al described a case of component wear after TKA with extruded metallosis in the extra-articular tissue of the calf. Radiologic evaluation revealed severe osteolysis and loosening of prosthetic components and an intramuscular abcess communicating with the medullary canal of the tibia through an undisplaced peri-prosthetic fracture. The patient developed rhabdomyolysis with acute renal failure.

Acute compartment syndrome is a rare complication of TKA that requires early recognition and prompt decompression to prevent long-term disability. Haggis et al reported a series of 7 cases. Six of the cases resulted in the loss of at least 1 compartment, and 1 resulted in amputation. Four of the cases resulted in legal action. It has been suggested that important risk factors contributing to the development of this condition include complex surgery, soft tissue compromise, previous surgery, and possibly vascular disease.

Compression of the peripheral nerves is a well-known complication of articular synovial cysts. The peroneal nerve is the most common site of intraneural ganglia (pseudocysts) originating from the proximal tibiofibrular joint. The neurological deficit associated with these cysts is often severe because of delayed diagnostic and surgical treatment. Therefore, recurrence is often seen and recovery is incomplete. Rein et al described a case of peroneal nerve palsy caused by a recurrent proximal tibiofibrular joint ganglion.

However, to the authors’ knowledge, there are no reports in the literature that describe the current complication of a chronic compartment syndrome with peroneal palsy due to a cystic seroma that is induced by PE wear following TKA.

**CONCLUSION**

Polyethylene wear in TKA may lead to osteolysis and subsequent implant loosening. The current case shows that wear of the PE insert may also lead to ganglion formation that causes paresis of the peroneal nerve. This complication emphasizes the importance of regular clinical and radiographic follow-up examinations for patients with total knee replacements, even and especially in the long term.

**REFERENCES**


