Recurrent Hemarthrosis After Unicompartmental Knee Arthroplasty

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Abstract

Recurrent hemarthrosis after knee arthroplasty can be disabling, requiring adequate and immediate diagnosis and treatment for recovery of symptoms and joint function. The most commonly reported cause is impingement of proliferative synovium between prosthetic components. Although various procedures for hemarthrosis have been reported after knee arthroplasty for patients who do not respond to conservative treatment, the recommended first-line therapy is open surgery or embolization. Although hyperplastic synovium was observed during the first and second arthrotomy, in our case, tissue impingement was not detected. We describe a rare case of recurrent hemarthrosis after unicompartmental knee arthroplasty (UKA) and successful treatment by open synovectomy. A 66-year-old woman presented with spontaneous osteonecrosis of the medial femoral condyle in the right leg. She underwent UKA of the right knee of the medial condyle. Eighteen months after UKA, the patient developed recurrent hemarthrosis. Open arthrotomy was performed 22 months after UKA, revealing only hematoma with no obvious hemorrhage or loosening of the prosthesis. No history of trauma or use of anticoagulant medications was present. After a symptom-free period of 8 months, another 2 episodes of hemarthrosis occurred over the course of 8 months. A second open arthrotomy was performed. Hyperplastic synovium with fibrin and hemosiderin pigmentation was observed, again without hemorrhage or loosening. There were no pathological features of pigmented villonodular synovitis. Synovectomy was performed, and no hemarthrosis has recurred for 2 years.

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Knee arthroplasty is a common procedure for elderly patients showing deleterious cartilaginous changes. Major complications include deep venous thrombosis (DVT), pulmonary embolism, infection, nerve palsy, periprosthetic fractures, joint instability, problems with wound healing, component loosening, and component failure. Recurrent spontaneous hemarthrosis after knee arthroplasty in the absence of anticoagulant medications or a bleeding disorder is rare, with a reported incidence of 0.1% to 1.6%. Recurrent hemarthrosis can be disabling, requiring adequate and immediate diagnosis and treatment for recovery of symptoms and joint function. The most commonly reported cause is impingement of proliferative synovium between prosthetic components. This article describes a rare case of recurrent hemarthrosis after unicompartmental knee arthroplasty (UKA) and successful treatment by open synovectomy.

CASE REPORT

A 66-year-old woman underwent UKA of the right knee for spontaneous osteonecrosis of the medial femoral condyle. No postoperative complications were identified. However, 18 months after the primary operation, her knee was swollen with acute spontaneous pain. A large amount of blood was aspirated from the knee joint, with immediate relief of pain. She could not recall any cause of acute swelling or pain. Despite conservative therapy, such as aspiration, rest, and cooling, another 2 episodes of spontaneous hemarthrosis occurred during the following 4 months. No history of trauma or use of anticoagulant medications was present.

Laboratory testing showed no abnormalities. A coagulation study, including bleeding time, coagulation time, prothrombin time, and activated partial thromboplastin time, yielded normal results. The Lumpel-Reede test was negative. A second operation was performed 21 months after UKA. After thorough lavage of the knee joint, no visible bleeding source was identified. Likewise, no signs of loosening of the prosthesis were apparent. The hyperplastic synovium appeared brown in color. A few microbleeds from capillary vessels were coagulated using a bipolar coagulator.

After a symptom-free period of 8 months, another 2 episodes of hemarthrosis occurred over the course of 8 months. A third operation was therefore performed. As in the second operation, no visible bleeding source or signs of prosthesis loosening were identified. The synovium was found to be hyperplastic, and synovectomy was performed (Figure). Pathological testing revealed the chronic synovitis with fibrosis and hemosiderin staining. There were no pathological features of pigmented villonodular synovitis. As of 24 months after synovectomy, the patient remains symptom-free.

DISCUSSION

Recurrent hemarthrosis has been attributed to synovial hyperplasia, vascular abnormality, anticoagulant therapy, and metal particles in the joint. Although reported cases of hemarthrosis after arthroplasty have most often occurred with total knee arthroplasty (TKA), several cases of hemarthrosis after UKA have been described. Similar to TKA, causes of hemarthrosis after UKA are thought to involve synovitis, probably due to the presence of metallic debris and hyperplastic blush of the descending genicular artery. No relationships to the type of prosthesis or use of cement have been identified. 12

The most distinctive source of hemarthrosis is thought to be impingement of the proliferative synovium between articulating prosthetic components. Reported causes of hemarthrosis have included pieces of synovial tissue or fat pad in 9 of 21 patients, a polypoid mass of vascular and hyperplastic synovium in 1 case, and proliferative synovial tissue in 4 of 7 patients and 2 of 6 patients. Meanwhile, 4 of 6 patients who underwent arthroscopic synovectomy for hemarthrosis showed recurrent hemarthrosis. 2

Although detecting tissue impingement is difficult, open synovectomy is recommended as a curative procedure when symptoms do not resolve after conservative treatment. Despite the risk of infection and delayed rehabilitation, open surgery is worthwhile because open synovectomy shows a high recovery rate, and components are sometimes a cause of hemarthrosis. Revision of loose or failed components can thus resolve symptoms without requiring synovectomy. In addition, no recurrence of hemarthrosis was seen in 1 case after revision of components despite no obvious abnormal motion of the components. Open surgery targets synovectomy and allows revision of prosthetic components for hemarthrosis therapy.

In contrast, some recent reports have described the embolization of hemarthrosis after TKA. Angiography is a useful investigation for the identification of vascular blush or hypervascularization of the genicular artery. Pseudoaneurysms from the popliteal artery and genicular artery or arteriovenous fistula have also been reported. Ultrasonography is helpful to detect hypoechoic masses in the popliteal fossa with bidirectional Doppler flow consistent with popliteal artery aneurysm or pseudoaneurysm. Embolization of these vascular abnormalities results in immediate improvement of symptoms in most cases. In only 1 case, hemarthrosis occurred after first embolization. Second embolization was successfully performed. 6 Despite risks of skin or tissue necrosis or allergic reaction to contrast dye, angiography and embolization are curative treatments that avoid major surgery. Pham et al performed arthroscopy and noted only...
hyperplastic synovial membrane 2 weeks after successful embolization.

Hyperplastic vascular synovium is usually treated by resection, and may be recognized as vascular blush and embolized. This suggests the possibility that indications of embolization for hemarthrosis include not only vascular abnormalities, but also impingement of proliferative synovium that is usually resected by major surgery. However, a case has been reported of a patient who showed no false aneurysm on prerevision angiography and experienced no recurrence of hemarthrosis after component revision despite a lack of obvious abnormal motions of the component. Revision of components should be considered for cases in which no abnormality is observed on angiography. Interestingly, defects in the availability of platelet factor 3 in some patients have been attributed to hemarthrosis. Routine coagulation profiles were normal, and no patients showed recurrent hemarthrosis after platelet transfusion. Furthermore, synoviosarcoma by injection of 6.5 mCi of yttrium 90 into the knee joint to diminish the size of the proliferative synovium was a successful treatment.

Although various procedures for hemarthrosis have been reported after TKA for patients who do not respond to conservative treatment, the recommended first-line therapy is open surgery or embolization. Since these procedures have advantages and disadvantages, treatment should be selected based on the individual patient. In our case, hyperplastic synovium was observed during the first and second surgeries. Although tissue impingement was not detected, we performed open synovectomy, and the patient has since remained symptom-free for 2 years.

REFERENCES