CASE REPORT

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Vascular Injury Following Revision Knee Arthroplasthy

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ABSTRACT Acute arterial occlusions are uncommon complications in total knee arthroplasty (TKA). This complication is seen more in TKA revision surgery, and when appropriate treatment cannot be made, amputation may be necessary. The present case is here presented of a patient applied with TKA revision and popliteal artery occlusion developed in the early postoperative period. The patient was a 70-year old female not actively working. The diagnosis of popliteal artery occlusion, which formed after the revision surgery. Before the decision for reoperation, the diagnosis was confirmed with advanced examination such as computed tomography angiography at the 3rd hour. Arterial exploration was made at the 4th hour. No arterial active bleeding had been observed intraoperatively. Popliteal thrombectomy was applied of popliteal artery trombosis. Acute arterial occlusion is a rarely encountered complication, but it requires emergency intervention. In revision knee artroplasthy surgery, postoperative vascular examination should be done more carefully, and advanced radiological examination should be performed in case of suspicious arterial examination.

Keywords: Knee arthroplasty; revision surgery; vascular system injury; arterial oclusion

Vascular complications are rarely seen in total knee arthroplasty (TKA), and injuries are classified as (i) iatrogenic vascular injury, (ii) artery occlusion, and (iii) pseudoaneurysm.[1] While there is a low risk of popliteal artery penetrating injuries, iatrogenic vascular injury is seen at the rate of 0.003%.[2,3] Although popliteal artery occlusion following TKA is seen more often than iatrogenic injuries, the rate has been shown to be 0.03-0.2% and the rate of chronic vascular insufficiency after TKA is estimated to be 2%.[4-6] Although vascular injuries are seen at a low frequency, a vascular injury seen during prosthesis surgery is a nightmare situation for orthopaedic surgeons, and the condition seen may cause amputation and even mortality.[7] Therefore, in major surgery such as revision knee arthroplasthy (RKA), it is natural that vascular injuries can be seen more often.[8] However, there are few case reports of RKA vascular injuries, or they have been presented within studies that have examined TKA.[1,9]

When arterial occlusions are diagnosed late, the surgical interventions become more complex and the rates of failure increase. Conservative treatments are very limited in the treatment procedures and surgical intervention includes thrombectomy and bypass grafting.[10] The patient presented in this paper was applied with revision surgery because of aseptic loosening following primary TKA, acute popliteal arterial occlusion developed, the decision for surgery was taken early, thrombectomy was performed and successful results were obtained.

CASE REPORT

Written informed consent was obtained from the patient's parent. A 70-year old female presented on 02.11.2018 with the complaints of pain and not feeling confident in the right knee, which had been ongoing for one month. Three years previously, the patient had undergone TKA in another centre for a diagnosis of gonarthrosis. There was a history of a simple fall 11 months after the TKA operation, after which the complaints started and gradually increased. RKA surgery was planned because of instability and the patient was admitted to our clinic.

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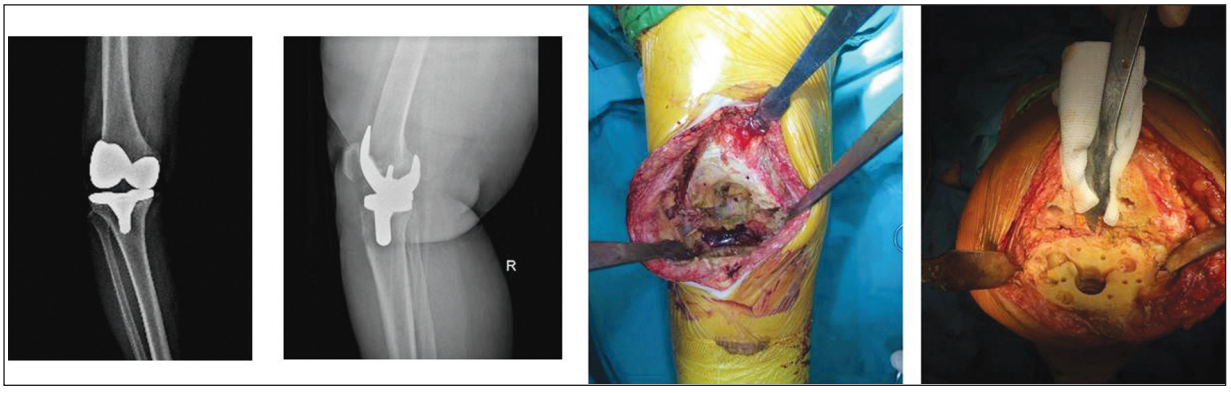

FIGURE 1: Preoperative graphies and intraoperative view with bone defect.

There was a 25-year history of hypertension and 3 years previously the patient had undergone coronary angiography. On physical examination, movement of the right knee was painful and there was instability in the coronal plane. No increase in temperature, redness or swelling was observed.

In the preoperative laboratory tests, blood values including platelet count, prothrombin time, and activated partial thromboplastin time, were within the normal range. Sedimentation and C-reactive protein values were normal. On the basis of the physical examination and the laboratory tests, aseptic loosening was considered. Preoperative graphies are shown in Figure 1.

The revision knee surgery was performed on 19.11.2018. The patient was positioned supine, and under spinal anaesthesia, the tournquet pressure was raised to 280 mmHg. The total tourniquet duration was 70 min. In the intraoperative evaluation, an Anderson Orthopaedic Research Institute 3 defect was observed (Figure 1).

Intraoperative frozen material was sent for examination, and was evaluated as acute inflammation. Following the appropriate cuts for bone implantation, treatment was made with a constrained condylar knee design implant (NexGen RH Knee, Zimmer, Warsaw, IN, USA). After closure of the joint, the tourniquet was deflated. A total of 400 cc fluid was collected in the drain in the first 30 min. Passive pressure was obtained and followed-up.

In the postoperative 2nd hour, pain, paresthesia and paleness developed in the right foot of the patient. On physical examination, the dorsalis pedis pulse was felt to be filiform. In the tests applied, the hemogram was determined as 8.6 mg/dL. As 900cc total fluid was in the drain in the 3rd hour, advanced tests were planned. On the computed tomography angiography, there was seen to be no blood flow in the anterior tibialis artery and at the level of the popliteal artery trifurcation and at 2 cm proximal of the popliteal trifurcation, and filling of the posterior popliteal artery 3 cm distal of the popliteal artery trifurcation could not be explained radiologically (Figure 2).

FIGURE 2: Blood flow in the computed tomography radiography.

Emergency exploration was planned as a result of the severe clinical and radiological findings. In the postoperative 4th hour, the patient was re-admitted for surgery for exploration together with a microsurgery specialist.

SURGICAL PROCEDURE

The patient was positioned prone. The posterior of the knee was opened with a lazy-S incision. No active arterial bleeding was observed in the exploration. The

popliteal artery was then evaluated in detail. Occlusion was seen 4 cm proximal of the popliteal artery bifurcation, and arterial dilatation proximal of the occlusion. Thrombus was observed in the popliteal artery (Figure 3).

Thrombus was considered, and open thrombectomy was applied proximal of the stasis with the Fogarty catheter. The vascular damage was evaluated again after the thrombectomy. Peripheral pulses were palpated. After confirming blood flow with Doppler, the surgery was terminated.

FOLLOW-UP

The patient was followed-up first in the intensive care unit for 2 days. When the vital signs and hemogram were observed to be stable, the patient was transferred to the orthopaedics and traumatology ward, where follow-up continued for 7 days. A control radiograph was taken on postoperative day 1 (Figure 4).

On the 4th day of follow up, the patient was mobilised. With a continuous passive motion device, joint range of motion reached 90° on the 6th day. The patient was discharged on the 7th day. At the final follow-up examination, the Western Ontario and McMaster Universities Arthritis Index score was 84 and joint range of motion was 100°.

DISCUSSION

Although arterial occlusion is rarely seen, in a study of 31 patients who developed acute arterial occlusion after TKA, it was reported that amputation was necessary in 11 (35.5%) cases.[11] Patients must be routinely examined in the early period, and in the postoperative period, severe pain and paresthesia in the ipsilateral extremity should be warnings in respect of vascular injury, and when there is paleness, coldness, and no pulse, advanced tests are necessary.[3]

A total of 3,018 TKA and 225 RKA patients treated in our clinic since 2012 were examined and there was a single knee arthroplasty patient observed with vascular injury, giving a frequency of 0.03% of all knee arthroplasties and 0.4% of RKA. In a similar study, Rand et al. examined 9,022 patients, and reported that acute artery occlusion developed in 3

FIGURE 3: Posterior approach in the knee and popliteal arter occlusion on behind of prothesis.

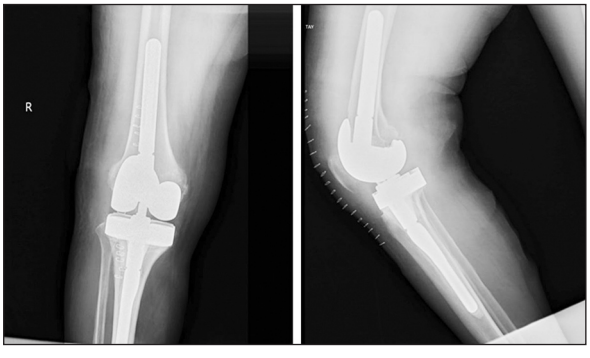

FIGURE 4: Postoperative antero-posterior and lateral graphy.

(0.033%) patients after TKA.[4] In another study by Calligaro et al., of 4,097 TKA patients, 7 (0.17%) cases of acute arterial occlusion were reported.[5]

Arterial occlusions often occur with the formation of thrombosis as the result of a traumatised calcified vessel. The presence of peripheral vascular disease, the use of a tourniquet in calcified femoral and popliteal arteries, and manual reduction of flexion contractures constitute a risk for plaque rupture and embolisation.[12,13] Other risks include the presence of cancer, a history of arterial aneurysm, and revision surgery.[14]

Emergency thrombectomy is the first option in treatment, but if removal of the thrombus is not pos-

sible, surgical bypass is an alternative approach. In a study by Green and Allen, of revascularisations applied 8 hours after popliteal artery blood flow ceased, amputation was reported to be necessary in 86%.[15] This demonstrates the necessity for rapid revascularisation in treatment.

In conclusion, acute arterial occlusion is a rarely encountered complication, but it requires emergency intervention. In revision knee artroplasthy surgery, where anatomical structures are changed and excessive resection is applied during the intraoperative, postoperative vascular examination should be done more carefully, and advanced radiological examination should be performed in case of suspicious arterial examination. Succesful results and more minimal invaziv surgery prosedure are possible with early diagnosis for acute arterial occlusion.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

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