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Case Report

Thromboembolectomy in a Patient with Acute Arterial Occlusion in the Lower Limb and Complex Postoperative Evolution: Challenges in Emergency Hospital Practice

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Abstract: We report the case of an elderly patient presenting with acute arterial occlusion of the lower limb, diagnosed and treated with emergency thromboembolectomy. The patient experienced postoperative complications, including reperfusion syndrome with acute kidney injury requiring dialysis support, as well as a urinary tract infection treated with antibiotic therapy. The clinical and laboratory evolution was closely monitored, culminating in discharge with recommendations for outpatient follow-up. This case highlights the challenges of managing acute arterial occlusions in elderly patients, focusing on complications associated with the procedure and prolonged hospitalization.

Keywords: Thromboembolectomy; Acute Arterial Occlusion; Acute Kidney Injury; Reperfusion; Elderly Patient; Renal Replacement Therapy.

1. Introduction

Acute arterial occlusion of the lower limbs is a critical condition that requires prompt diagnosis and immediate intervention to prevent limb loss and systemic complications. The annual incidence of acute arterial occlusion is estimated at approximately 1.5 cases per 10,000 inhabitants, with a mortality rate of 15% to 20% in high-risk populations such as elderly patients with multiple comorbidities [1, 2]. Elderly patients represent a particularly high-risk group due to the common presence of cardiovascular, renal, and metabolic diseases, which increase their susceptibility to both preoperative and postoperative complications [3, 4].

The management of these occlusions often involves revascularization of the limb through thromboembolectomy or thrombolytic therapy to restore blood flow and prevent irreversible ischemia [5]. However, revascularization in high-risk patients can trigger reperfusion syndrome, a condition associated with the release of free radicals and inflammatory mediators, leading to systemic effects that may result in organ dysfunction. Studies indicate that up to 30% of patients with reperfusion syndrome develop significant complications, such as acute kidney injury and shock, particularly among elderly patients with reduced physiological reserves.

2. Case Report

A 68-year-old female patient was admitted on September 10, 2024, to Conde Modesto Leal Hospital, presenting with sudden pain in the left lower limb (LLL) accompanied by significant swelling (++/++++) (Figure 1) and hardening of the left calf. An initial diagnosis of deep vein thrombosis (DVT) was established, and full anticoagulation treatment with enoxaparin (Clexane) was initiated. A venous Doppler ultrasound of the LLL was requested to evaluate the condition. However, on September 12, the patient experienced worsening symptoms, including coldness and severe pain in the LLL. An arterial Doppler ultrasound was requested, and the patient was urgently referred to a vascular surgery unit at Dr. Ernesto Che Guevara Municipal Hospital.

Figure 1. Preoperative image of the left lower limb showing cyanosis and significant swelling in the forefoot, indicative of critical arterial ischemia.

At 4:00 PM on the same day, the patient was evaluated by the vascular surgeon, presenting with severe pain, a palpable femoral pulse, absent distal pulses, and non-fixed

cyanosis in the forefoot. Arterial Doppler ultrasound revealed acute arterial occlusion of the superficial femoral artery, extending from its origin to the Hunter's canal. Venous Doppler ultrasound ruled out signs of DVT. Emergency surgery with thromboembolectomy was indicated [6], as the initial DVT diagnosis was not confirmed by Doppler, and the new diagnosis of arterial occlusion required immediate surgical intervention to preserve the foot.

The surgery was performed at 6:00 PM using a Fogarty catheter in the common femoral, superficial femoral, and deep femoral arteries, enabling the removal of an extensive thrombus and restoration of arterial flow (Figure 2). The patient received systemic anticoagulation with heparin (5000 IU IV), with no reversal post-procedure. During thromboembolectomy with a Fogarty catheter, several technical challenges may arise. The insertion of the catheter into the arteries can encounter obstacles due to complex anatomy or pre-existing vascular alterations, such as calcifications, tortuosity, or stenosis, which complicate catheter navigation and handling. These conditions are especially common in elderly patients or those with a history of atherosclerosis, potentially limiting the procedure's effectiveness. Additionally, complete thrombus removal can be challenging when thrombus fragmentation occurs during the procedure, necessitating multiple catheter passes or leading to secondary embolization in distal regions.

Another technical challenge involves assessing the adequacy of blood flow restoration after thrombus removal. Even after the main thrombotic material is extracted, small residual fragments may persist, hindering full arterial flow recovery and increasing the risk of re-occlusion. Intra-procedural coagulation and difficult access to deep vessels, such as the deep femoral artery, also pose challenges, requiring careful catheter manipulation to avoid vascular damage.

Alternatives to surgical thromboembolectomy may be considered depending on the patient's clinical condition and the occlusion's complexity. One option is catheter-directed thrombolysis, where thrombolytic agents such as alteplase or urokinase are delivered directly to the thrombus via a specialized catheter. This method can be advantageous for patients who are not ideal candidates for surgery, as it avoids the need for invasive intervention and allows gradual thrombus dissolution. However, this technique has limitations, including an increased risk of bleeding and a longer therapy duration, which may not be suitable for cases of recent-onset critical ischemia.

Another approach is mechanical thrombectomy using specialized endovascular devices that mechanically fragment and remove the thrombus. This method is less invasive than open surgery and can be performed in centers with advanced endovascular technology. Mechanical thrombectomy is particularly useful for large or thrombolysis-resistant thrombi and is indicated for patients with contraindications to thrombolytic therapy. However, mechanical thrombectomy requires a trained team and access to specific devices, which are not always available.

In cases where these options are not viable, systemic anticoagulation can be considered to temporarily stabilize the patient. Anticoagulants such as heparin or enoxaparin are used to prevent thrombus progression, although this approach does not resolve the existing occlusion. This management strategy can be a temporary measure until the patient is in better condition for a definitive procedure or when the risks of any intervention outweigh the potential benefits. These alternatives highlight the importance of a multidisciplinary evaluation to choose the safest and most effective approach for each patient, considering factors such as clinical stability, time of occlusion onset, and significant comorbidities.

The patient was transferred to the ICU for immediate postoperative (PO) monitoring and continued full anticoagulation 12 hours after surgery. On the third postoperative day, the patient developed acute kidney injury, diagnosed as reperfusion syndrome, with a significant increase in creatine phosphokinase (CPK). Nephrology consultation was requested, and hemodialysis was initiated. Laboratory tests recorded the progression and resolution of inflammatory and renal changes. Key laboratory values include: 09/10: CPK:

359 U/L, leukocytes: 11,300/mm³; 09/12: Leukocytes: 17,400/mm³, creatinine: 1.7 mg/dL, urea: 70 mg/dL; 09/15: Leukocytes: 8,780/mm³, CPK: 1627 U/L, urea: 132 mg/dL, creatinine: 2.8 mg/dL.

Figure 2. Image of the thrombi removed from the superficial femoral artery during the thromboembolectomy procedure, showing the extensive thrombotic material extracted to restore arterial blood flow.

On the fourth postoperative day, the LLL showed improvement, with normal warmth and coloration, absence of cyanosis, and recovery of distal perfusion (Figure 3). A transthoracic echocardiogram (TTE) revealed an ejection fraction of 23%, leading to the suspension of cilostazol and continuation of anticoagulation adjusted for renal insufficiency. In addition to acute kidney injury and the need for dialysis, the patient developed a urinary tract infection (UTI), which was treated with piperacillin-tazobactam (Tazocin) with good response. There were no other complications during hospitalization.

On September 19, 2024, the patient was presented with a well-healed surgical wound, a warm LLL with palpable femoral, popliteal, and distal pulses. Follow-up arterial Doppler confirmed biphasic flow with normal velocities. The patient was discharged from vascular surgery with recommendations for outpatient follow-up. She will continue intermittent hemodialysis at a specialized clinic. It is worth noting that patients on renal replacement therapy (RRT) often remain hospitalized while awaiting transfer to a dialysis clinic, which extends the length of hospital stay.

3. Discussion

This case highlights the challenges associated with managing acute arterial occlusions in the lower limbs, especially in elderly patients with significant comorbidities such as cardiovascular and renal diseases [7]. The decision to perform emergency thromboembolectomy with systemic anticoagulation was crucial to preserve the limb and reduce the risk of irreversible ischemia [8]. However, reperfusion syndrome resulting from the restoration of blood flow caused acute kidney injury (AKI), evidenced by elevated creatinine and urea levels, necessitating dialysis support [9].

Figure 3. Postoperative image of the left lower limb, showing normalized coloration, absence of cyanosis, and visual signs of perfusion recovery. This photo was taken 9 days after the surgery.

In the postoperative context with elevated renal markers, it is essential to consider differential diagnoses before confirming reperfusion syndrome as the primary cause of AKI. Key possibilities include acute tubular necrosis (ATN): this condition can result from prolonged hypoperfusion before surgery, associated with low tissue oxygenation. Differentiating ischemia-induced ATN from direct reperfusion injury is important for guiding appropriate management; rhabdomyolysis: in cases of prolonged muscle ischemia, the release of myoglobin into the bloodstream can lead to renal overload and exacerbate renal dysfunction. Markers such as CK and serum myoglobin should be assessed to rule out this condition; sepsis and associated AKI: in elderly and immunocompromised patients,

systemic infection can cause or exacerbate renal injury. The presence of a urinary tract infection during hospitalization increases the risk of sepsis, which may influence renal function deterioration. Considering these differential diagnoses and conducting comprehensive laboratory evaluations are critical steps to confirm the etiology of AKI and optimize therapeutic strategies.

Acute Kidney Injury (AKI) is a significant complication in cases of reperfusion syndrome, particularly in elderly patients. The management of AKI in patients who develop this complication after thromboembolectomy involves specific strategies: dialysis support: dialysis is often necessary for patients with progressive elevations in creatinine and urea levels. In this case, renal replacement therapy (RRT) was initiated due to severe renal impairment. Prompt initiation of dialysis is crucial to minimize metabolic toxicity and optimize recovery; Hemodynamic control and fluid balance: Rigorous monitoring of fluid balance is essential to avoid both overload and dehydration, which can further compromise renal function. Diuretics may be considered in patients without immediate dialysis needs but are contraindicated during severe oliguria; monitoring of metabolic markers and electrolytes: correcting metabolic and electrolyte disturbances, such as hyperkalemia and metabolic acidosis, is vital. Potassium and bicarbonate levels should be adjusted as needed, with targeted interventions to prevent arrhythmias and other systemic complications; minimizing nephrotoxic drugs: Avoiding medications that could worsen renal injury, such as certain antibiotics and nonsteroidal anti-inflammatory drugs (NSAIDs), is important. Alternative therapies should be considered to reduce the impact on renal function; long-term monitoring and assessment for renal recovery: in patients undergoing RRT, renal function should be periodically reassessed to determine recovery potential. The need for continued dialysis should be reevaluated over time, as renal function may return as the patient recovers from reperfusion syndrome; additionally, prolonged hospitalization due to delays in securing dialysis placement at a specialized clinic has significant implications. In resource-limited settings for patients on RRT, such delays can affect patient recovery and increase the risk of hospital-acquired complications, such as nosocomial infections. This underscores the importance of resource availability and efficient patient flow organization in healthcare institutions managing RRT patients.

Additionally, prolonged hospitalization due to delays in securing dialysis placement at a specialized clinic has significant implications. In resource-limited settings for patients on RRT, such delays can affect patient recovery and increase the risk of hospital-acquired complications, such as nosocomial infections. This underscores the importance of resource availability and efficient patient flow organization in healthcare institutions managing RRT patients.

3. Conclusion

This case emphasizes the importance of a multidisciplinary approach in managing acute arterial occlusion, particularly in patients at high risk for renal and cardiovascular complications. Studies have demonstrated that thromboembolectomy in elderly patients can be effective in restoring perfusion and preserving the limb but is also associated with a high incidence of postoperative complications, such as renal failure and cardiovascular events.

In an analysis of emergency thromboembolectomy outcomes in elderly patients, Zettervall et al. [10] reported an 80% success rate in limb preservation, although 30% of patients developed severe renal or cardiovascular complications requiring intensive management [10]. Another study by Taha et al. [11] highlighted that, while thromboembolectomy is a high-risk intervention, it can extend survival and improve quality of life if measures for strict control of systemic complications are implemented [11].

In this case, thromboembolectomy was effective in restoring perfusion, but reperfusion syndrome and the need for dialysis support prolonged hospitalization. This experi-

ence underscores the importance of clinical protocols for managing complications in elderly patients, such as proactive monitoring to detect early signs of reperfusion syndrome and acute kidney injury. Furthermore, it highlights the need for strategies to minimize hospital stays for patients on renal replacement therapy, including the use of early in-hospital dialysis techniques, particularly in institutions with limited availability of RRT units.

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