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Surgery of Acute Ischemia of the Limbs

Wilfried Elohonnan Gandji[1,2*], Pape Adama Dieng[1], Magaye Gaye[1], Ndeye Fatou Sow[1], Momar Sokhna Diop[1], Pope Amath Diagne[1], Amina Kheroumy[1], Delphin Kouassi Mehinto[2], Mouhamadou Ndiaye[1]

[1]Thoracic and Cardiovascular Surgery Department of Fann Dakar, Senegal
[2]Visceral surgery department of the Hubert Koutoukou University Hospital Maiga Cotonou, Benin

***Corresponding author:** Wilfried Elohonnan Gandji
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Abstract | **Original Research Article**

Introduction: Acute ischemia of a limb is a phenomenon of extreme gravity. It is one of the most common vascular emergencies, with a high risk of amputation, if not treated appropriately. Here we report the early and mid-term results of surgical management of acute limb ischemia. ***Methods:*** This was a retrospective study performed on all patients who underwent surgery for acute limb ischemia between January 2004 to December 2013 at the Cardiovascular Surgery Department of the Fann National and University Hospital Center, Dakar**.** ***Results:*** The mean age of the patients was 51 years (7 years, 85 years) with a male predominance. The average duration of symptom progression was 120 hours (one hour at 720 hours). The initial diagnosis of ischemia of the limbs was mainly done on the basis of the clinic. 85.7% of patients had undergone surgery, while five patients had received conservative treatment. The results were favorable in 60.7% patients. ***Conclusion:*** Surgical management is acute limb ischemia is effective with satisfactory results and requires rapid management

Keywords: Acute ischemia, thrombosis, embolism, surgery.

INTRODUCTION

Acute ischemia is the result of significant arrest or reduction of arterial blood flow by obstruction of a main arterial trunk. Acute limb ischemia is one of the most common vascular emergencies, with a high risk of amputation, if not treated appropriately [1, 2]. The treatment can restore sufficient blood flow to avoid the complications of ischemia.

The aim of this work is to evaluate the early and mid-term outcomes of surgical management of acute limb ischemia.

PATIENTS AND METHODS

A retrospective study was performed on all consecutive patients who underwent surgery for acute limb ischemia between January 2004 to December 2013 at the Cardiovascular Surgery Department of the Fann National and University Hospital Center.

Patients (18) who had exceeded ischemia, gangrene were excluded.

Thus 56 patients were included in the study. These are patients with sudden onset pain. On inspection, the limb was pale and on palpation it was cold.

Clinical vascular examination and color ultrasound were performed in all cases.

Patients were treated surgically. Their files were exploited using the software epi info version 3.5.1 which also allowed the statistical analysis.

RESULTS

The average age of patients was 51 years with extremes of 7 years and 85 years. The mean duration of evolution of ischemia was 120 hours with extremes of less than one hour at 720 hours (30 days). Twelve patients (21.4%) had intermittent claudication in history. Patients' vascular risk factors were dominated by smoking, high blood pressure and diabetes (Table-1).

The initial diagnosis of ischemia of the limbs was mainly done on the basis of the clinic. In fact, all patients had limb pain, 71.4% had cold extremities, 51.8% neurological disorders, and no pulse in all patients (Table-2). Ultrasound morphological examinations in 35 patients, CT angiography in 7 patients, and conventional angiography were used as diagnostic tools. Thus, etiology included embolism in 19 patients, thrombosis in 37 patients and 8 trauma cases in 8 patients (Table-3).

The most frequent location of the obstacle was on the superficial femoral artery in 48.21% of patients. The upper limb was affected in one case and the localization found was the axillary artery in one case (Table-4).

A total of 48 (85.7%) surgeries were performed, while five patients received conservative treatment (Table 5).

The interventions performed were embolectomy and thrombectomy using a Fogarty balloon catheter in 71.4% of patients; bypass surgery of large saphenous vein in 3.6% of patients, thromboembolism, and thrombectomy. endarterectomy (n = 1, 1.8%), and vascular wound suture (n = 2, 3.6%).

The results were favorable in 60.7% patients with a clinical improvement including regression of the pain, the presence of local heat, the presence of capillary pulse or Doppler flow with ultrasound control which did not show a reocclusion of the arterial bed désoblitéré.

However, some complications were observed (Table-6). Indeed the persistence of ischemia was observed in 39.3% of patients, infections and sepsis (n = 9, 16.1%) syndromes of the lodges (n = 3, 5.35%) and revascularization (n = 5.8.9 %).

The failure of revascularization was observed in four patients and a major amputation was performed in all four patients.

The mortality was 14.3%. It was mainly due to infections and sepsis (16.1%), revascularization syndrome (8.9%).

The functional sequelae had been observed in four patients (7.1%), it was a decrease in motor function (8.9%), a decrease in sensory function (10.7%), and the persistence of pain (33.9%).

Table-1: Sociodemographic characteristics and risk factors of patients

Characteristics	Number	Percentage
Male	31	56,4
HTA	19	33,9
Diabetes	10(17,9)	17,9
obesity	3(5,4)	5,4
Stroke	3(5,4)	5,4
Smoking	34(60,71)	60,71
Heart diseases	16(28,07)	28,07
Rhythm disorders (ACFA)	3(5,4)	5,4
Surgery (amputation, prosthesis, mitral valve replacement, abdominal aortic aneurysm repair)	5(8,9)	8,9
Other factors (tumor, pathology)	5(5,4)	5,4

Table-2: The Clinical Elements of the Positive Diagnosis

Clinical features	Number	Percentage
Pain	57	100
Colder ends	40	71,4
Trophic disorders	21	37,5
ulcers	2	3,6
necrosis	4	7,1
cyanosis	12	21,4
Neurological disorders	29	51,8
Absence of pencil doppler flux	31	55.4

Table-3: Etiologies and circumstances of occurrence of limb ischemia

Etiologies	Number	Percentage
Embolism	19	33,92
thromboses	29	51,9
Trauma	8	14,3

Table-4: Topography of arterial obstruction at the limb level

Locations	Number	Percentage
Aortic Crossroads	1	1,8
ilio-femoral	10	17,85
femoro-popliteal	28	50
axillary	1	1,8

Table-5: Different Surgical Methods Used for Revascularization

Surgical Methods	Number	Percentage
Embolectomy	40	71,4
Thrombo-Endarterectomy	1	1,8
Bridging	2	3,6
Suture wound vascular	2	3,6
Amputation (leg, thigh)	4	7,1
Surgical abstention	8	14,28

Table-6: Complications after revascularization

Complications	Number	Percentage
Persistent Ischemia	22	39,3
Sensory Neurological Sequelae	6	10,7
Neurological motor sequelae	4	7,1
Operative site infections	9	16,1
Syndrome of the lodges	3	5,4
Revascularization syndrome	5	8,9

DISCUSSION

The average time between onset of symptomatology and admission to the cardiovascular surgery department was 120 hours with extremes of less than one hour at 720 hours (30 days). This delay is very long and could be a pejorative factor in the management as reported by some authors such as Fagundes *et al*., [3] who found that the only prognostic factor of amputation or death in cases of acute ischemia member would be access to medical care and the time to care.

In this study, the most common cause of limb ischemia was thrombosis, and the superficial femoral artery was observed as the most frequent site of obstructions, as evidenced by literature data or arterial thromboses. Usually sit on the lower limbs [4]. It is a thrombosis occurring on diseased arteries, in arteritics.

The average age of patients was 51 years with extremes of 7 years and 85 years. The high age of our patients could explain the thrombotic origin because the thromboses of atheromatous arteries are today the first etiology of acute limb ischemia. The explanations are mainly due to the aging of the population and better medical management of emboligenic heart disease (anticoagulants, antiarrhythmics, earlier detection of valvulopathies). The most recent data report about 45% of embolic causes versus 55% of thrombotic causes [5].

The male predominance has been as in many series and it could explain the thrombotic origin because we consider the female sex as the least affected and having a negative prognostic factor on the results of vascular interventions for ischemia of the lower limbs [6]. This is because of the presumed protective role of estrogen-progestins.

The diagnosis was made mainly on the basis of the history of the disease and the clinical signs. Doppler ultrasound (62.5%) was the most used diagnostic tool. This diagnostic approach has been reported by some authors such as Spinelli *et al*., [7] who reported that Doppler ultrasound was the most widely used diagnostic tool and Licht *et al*., [8] who reported that 88% of operations were performed solely based on the patient's medical history and physical examination.

In our center, when limb ischemia is suspected from the patient's disease history and physical examination, Doppler ultrasound of the limbs was used as a diagnostic tool to identify lesion localization, the search for multiple lesions, and a course of action has been adopted.

The results were favorable in 60.7% patients with clinical improvement, including regression of the pain, the presence of local heat, the presence of pulse or Doppler flow with ultrasound control which did not show a reocclusion of the arterial bed. deodorized, indicating a good strategy for surgical management.

However complications were observed including the persistence of ischemia, the syndrome of lodges and revascularization. They are observed during ischemia-reperfusion, in fact the increase in vascular permeability leads to an increase in tissue pressure inside the osteo-aponeurotic box, which can lead to a syndrome of the lodges and compromise the vascularization Nervous and vascular. This is aggravated by low cardiac output or excessively low blood pressure.

Taking tissue pressure can help the fasciotomy decision. There is however no threshold value. Tissue pressure greater than 5 mmHg [9] or a difference with diastolic blood pressure of more than 20 or 30 mmHg [10] should lead to performing a fasciotomy of discharge whose indications must in any case remain wide.

It is important not to wait until the pulse disappears to indicate the discharge incision, because if intracompartmental hyperpressure is sufficient to cause

capillary ischemia, it is usually not high enough to occlude the arterial axes.

Four patients had major limb amputation, which was related to the failure of revascularization. The large number of amputations and the high percentage of critical ischemia lead us to ask questions about the strategy of surgical management. In the short term, the surgical technique is associated with higher mortality, longer hospital stay and greater use in the intensive care unit [11].

In our series the mortality was 14.3% was mainly due to revascularization syndrome with vascular risk factors, terrain, infections and sepsis and metabolic disorders.

Numerous studies have been done on the delay between the onset of symptoms and management because this delay predicts the function of the long-term limb. Abbott *et al*., [12] reported that patients treated within 12 hours had a lower mortality rate and a higher limb salvage rate. H. Sekiya *et al*., [13] also found that the treatment results showed a linear relationship to the time difference between onset of symptoms and treatment. Bang *et al*., [14] also found that the prognosis differs significantly when more than 12 hours have elapsed between the onset of symptoms and treatment [15]. In this study, the time interval between onset of symptoms and subsequent treatment was related to postoperative sequelae. The very long evolution time was associated with a higher probability of sequelae.

Functional sequelae were observed in 4 patients (7.1%), with different patterns of symptoms in each patient. Post-treatment sequelae included decreased motor function (8.9%), decreased sensory function (10.7%), persistent pain (33.9%).

Functional sequelae were more frequent in patients with a longer duration of evolution because the longer the delay longer irreversible neurological lesions, responsible for functional sequelae.

CONCLUSION

Surgical management is acute limb ischemia is effective with satisfactory results and requires rapid management. However the results can improve because the complications exist and are usually due to a delay of evolution. It will therefore be necessary to sensitize the population and the health personnel because the prognosis of ischemia of the limbs is a function of a diagnosis and a fast and appropriate treatment.

State of Current Knowledge on the Subject

- The ischemia of the limbs is a phenomenon of extreme gravity.
- Limb ischemia is the most common vascular emergency, with a high risk of amputation

Contribution of Our Study to Knowledge

- It provides data on the frequency of limb ischemia in Senegal;
- Patients are at an advanced stage of the disease.
- The support is possible and adequate.

Conflicts of Interest

Authors do not declare any conflict of interest

Authors' Contributions

All authors participated in all stages of the development of this manuscript. All have read and approved the final manuscript, which is submitted for publication.

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