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Clinical experience of upper limb ischemia: a retrospective study

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ABSTRACT

Background: Arterial disorders of the upper extremity are much less common than those of the lower extremity, but when they result in symptoms of acute or chronic ischemia, surgical or endovascular techniques for upper extremity revascularization may be needed. This study presents a review of the epidemiology, aetiology, and clinical characteristics of upper limb ischemia.

Methods: The records of 70 patients with upper limb ischemia who underwent treatment from were retrospectively reviewed.

Results: A total of 44 patients were diagnosed by CT. Other diagnostic methods and tools used were conventional angiography and duplex ultrasound. Four cases were diagnosed solely on the basis of a medical history and physical examination. A total of 56 surgeries were performed. Rest of the 14 patients went under conservative therapy. The operations included embolectomy and thrombectomy using a Fogarty balloon catheter (n=32), bypass surgery using the great saphenous vein (n=10), percutaneous catheter-directed thrombolysis (n=8), and primary repair (n=4). Patients with Raynaud's phenomenon or Burger's disease were either treated with medication only (n=14) or with sympathectomy (n=2).

Conclusions: The duration of symptoms in cases of upper limb ischemia may vary from two hours to a year, depending on the aetiology and severity of the illness. Many debates have addressed whether the time gap between the onset of symptoms and treatment predicts long-term arm function.

Keywords: Arterial disorders, Embolectomy, Ischemia, Upper limb

INTRODUCTION

Arterial disorders of the upper extremity are not as much of frequent as those of the lower extremity, but when they result in symptoms of acute or chronic ischemia, surgical or endovascular techniques for upper extremity revascularization may be essential. Acute arterial disease, mainly acute embolism and trauma, is further widespread than chronic disorders of the upper extremity arterial system.¹

Acute upper limb ischemia (AULI) is an unusual vascular emergency with strict morbid consequences if disastrously treated. Its clinical features are comparable

to that of the lower limb and usually, the patient has about 6 hours from onset of symptoms to receive limb saving treatment. Though, this is dependent up on the site of the arterial occlusion and the growth of these ischemic changes depends on the effectiveness of the collateral blood supply in the area of the shoulder and elbow.^{2,3}

The most widespread aetiologies of chronic upper extremity ischemia are atherosclerotic disease and late stenosis or aneurysm related to a previous maybe initially missed, traumatic injury. Other less frequent aetiologies, such as arterial thoracic outlet syndrome (with or without poststenotic aneurysm) and upper extremity aneurysm, may point out the necessitate for upper extremity revascularization.^{4,5}

Nevertheless, delays in diagnosis and management are possible to result in strict functional injury and disability, yet in the lack of overt tissue loss.⁶ In a clinical circumstance, the shoulder and elbow are to a great extent forbearing of ischemia owing to their well-developed collateral circulation, and it is therefore more common to monitor ischemic symptoms underneath the elbow.⁷ This study presents a review of the epidemiology, aetiology, and clinical characteristics of upper limb ischemia.

METHODS

Study design and study duration

A total of 70 patients who underwent treatment for acute and chronic upper limb ischemia in a single center for the period of last five years were reviewed. Study was done from March 2018 to April 2019 at the tertiary care institute at Rajkot, India.

Ethical approval was taken from institute ethical committee and written informed consent taken from the study participants

We excluded the cases that occupied the formation of arterial insufficiency after the creation of arterio venous fistula for hemolysis. The baseline characteristics, comorbidities, etiologies, diagnostic tools, locations of the lesion, treatments, complications, and sequel after treatments were reviewed.⁸

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages, means and standard deviations. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

RESULTS

A total of 70 patients were included in the study. The median age of the patients were found to be 53 years. Computed angiography was used for the initial diagnosis of upper limb ischemia. A total of 44 patients were diagnosed by CT. Other diagnostic methods and tools used were conventional angiography and duplex ultrasound. Four cases were diagnosed solely on the basis of a medical history and physical examination (Table 1).

Table 1: Diagnostic tools used in the study.

Diagnostic tools	N	
CT angiography	44	
Conventional angiography	20	
Physical examination and history	4	
Duplex ultrasound	2	

Aetiology of the upper limb ischemia were found to be acute and chronic as listed below (Table 2), embolism of the cardiac origin was found to be the most common etiology with maximum of 44 patients diagnosed.

Table 2: Aetiology of the upper limb ischemia.

Aetiology	N
Embolus from heart origin	22
Trauma	14
Embolus from aortic arch	2
Raynaud's diseases	8
Burger's diseases	6
Atherosclerosis	4
Thoracic outlet syndrome	4
unknown	10

This was followed by thrombosis with secondary trauma found in 28 patients. Locations of the lesions were found in the Table 3. Brachial artery location was the most common, found in 34 patients. Patients with Dukes A stage did not receive postoperative chemotherapy and were advised regular follow up. 38 patients received postoperative chemotherapy. 18 patients were given radiotherapy. New evidence suggests a role for anti-inflammatory drugs in the treatment and prevention of colon and rectal cancers.

Table 3: location of lesions.

Locations	N
Innominate artery	2
Subclavian artery	8
Axillary artery	6
Brachial artery	34
Radial artery	4
Ulnar artery	8
Palmar arterial arch	8

A total of 56 surgeries were performed. Rest of the 14 patients went under conservative therapy. The operations included embolectomy and thrombectomy using a Fogarty balloon catheter (n=32), bypass surgery using the great saphenous vein (n=10), percutaneous catheter-directed thrombolysis (n=8), and primary repair (n=4). Patients with Raynaud's phenomenon or Burger's disease were either treated with medication only (n=14) or with sympathectomy (n=2) (Table 4).

Table 4: Treatment of the upper limb ischemia.

Treatment	N
Embolectomy or thrombectomy	32
Bypass with great saphenous vein	10
Percutaneous catheter direct thrombolysis	8
Primary repair	4
Sympathicotomy	2
Conservative therapy	14

In case of embolism associated with atrial fibrillation, emergency embolectomy was performed first followed by echocardiography to re-evaluate the condition of heart. If a patient had a history of other heart diseases, the treatment strategy was determined in consultation with the cardiology department. Imaging of the brain, lower extremities, or mesenteries was not performed if a patient did not complain of symptoms in other areas. Anticoagulation drugs were used for the treatment of isolated atrial fibrillation.

Five deaths occurred during the course of follow-up. Two of those deaths occurred within 30 days of the operation, and was due to postoperative rhabdomyolysis with acute renal failure. The other deaths were due to acute small intestinal infarction (2), acute myocardial infarction (2), and unknown causes (4). Four cases of reobstruction were noted.

DISCUSSION

Vascular disorders of the hand and upper extremity include a broad spectrum of diseases ranging from acute limb-threatening ischemia to chronic disabling disease. even though less widespread than lower extremity vascular disease, upper extremity disease influences as much as 10% of the population. Acquaintance with normal vascular anatomy, the common pathologic entity that affect the upper extremity, and drawback of magnetic resonance (MR) angiography of the upper extremity is imperative to make sure optimal image quality and accurate interpretation.

The epidemiology of upper limb arterial disease is tricky to consider, owing to its low incidence and enormous number of aetiologies. The anatomical location and aetiology are the two major criterion for classify upper limb arterial disease. ¹⁰ The anatomical location is subdivided into the small or large arteries, and the aetiology is subdivided into either occlusive disease or vasospasm. Abundant studies of acute arterial occlusion in the lower extremities have been conducted; nevertheless, modest information is accessible concerning arterial occlusions of the upper extremities. ¹⁰

The management of AULI is difficult due to its infrequency, changeable appearance, wide collection of aetiologies, and not have of evidence-based guidelines. A thorough history and physical are necessary to direct initial care and should be supplemented by diagnostic exams such as ultrasonography and computed tomography (CT) as necessary.

Spinelli et al concluded that duplex ultrasound was the generally extensively used diagnostic tool. ¹¹ In contrast, Licht et al reported that 88% of operations were performed based only on the patient's medical history and a physical examination. ¹² In our centre, when upper limb ischemia was alleged from a patient's medical

history and a physical examination, CT angiography was used as the initial analytical tool in 62.9% of cases.

Brunkwall et al reported a postoperative two-year recanalization rate of 60-90%.¹³ In present study, 46 patients (65.7%) underwent surgical alteration, of whom five (14.3%) undergo bypass surgery using the reversed great saphenous vein. In this study, several cases of upper limb ischemia were connected with Raynaud's phenomenon, which occupy periodic vasospasm when the patient is exposed to cold or psychosocial stress. It typically resolves logically, but can persist and turn into a problem.¹⁴

CONCLUSION

The duration of symptoms in cases of upper limb ischemia may vary from two hours to a year, depending on the etiology and severity of the illness. Many debates have addressed whether the time gap between the onset of symptoms and treatment predicts long-term arm function.

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Institutional Ethics Committee

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