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Case Report

A-55-Years-Old Chronic Smoker Presented with Right Upper Limb Ischemia, Septicemia, Acute Kidney Injury, Acute Liver Injury, Acute Superior Mesenteric Artery Occlusion and Colonic Ischemia: Rare Case Report

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Summary

55-years-old chronic smoker had acute, severe pain in the right forearm for one week. He underwent below elbow amputation of left upper limb for acute limb ischemia one year ago. Axillary, brachial and radial pulses were not palpable. The skin was cold discolored and tender up to mid-arm on right side. Weakness of movement of elbow joint and sensation were noted. CT angiogram revealed complete occlusion of subclavian artery downwards on both sides. Parenteral heparin and antibiotics were given. Above elbow amputation was done; there was no active bleeding at brachial artery. Thrombosis was noted along brachial artery. Moreover, the color of muscle was brownish and consistency was soft and flabby. It was complicated by sepsis, DIC, acute kidney injury and acute liver injury. Bone shortening of amputated stump was done on Day '6'. The patient had sudden onset of severe chest pain during hemodialysis on Day '12'; it was briefly followed by sudden death. Autopsy revealed acute thrombus in superior mesenteric artery with acute gangrene of colon; coronary ostia were patent. Pain from acute superior mesenteric artery occlusion was referred to precordium and it mimicked acute coronary syndrome.

Keywords: Chronic smoker, Upper limb ischemia, Septicemia, Acute kidney injury, Acute liver injury, Superior mesenteric artery occlusion, Colonic ischemia

Introduction

Acute arterial occlusion is same as acute limb ischemia. It is one of vascular emergency. Acute limb ischemia is a sudden loss of limb perfusion for up to 2 weeks after an inciting event. Acute arterial occlusion can occur in any peripheral artery of the upper and lower extremities; it may occur in carotids, coronary and visceral arteries. The incidence of acute peripheral arterial occlusion causing acute lower extremity ischemia is approximately 1.5 cases per 10,000 persons per year [1]; the prevalence rises with age. Epidemiological studies indicate that up to 5% of men and 2.5% of women 60 years of age or older have symptoms of intermittent claudication [2]. Risk factors include age, smoking, diabetes, obesity, sedentary lifestyle, family history of vascular disease, high cholesterol, and high blood pressure. Non-traumatic ischemia of the lower extremities is more common than the upper extremities and is more likely to result in limb loss. The management of acute ischemia includes surgical or catheter-based thromboembolectomy, bypass grafting, thrombolytic therapy, endovascular revascularization and percutaneous transluminal angioplasty [3-8]. The morbidity, mortality, and limb loss rates from acute lower extremity ischemia remain high [9]. Therefore, early diagnosis and rapid initiation of therapy are essential to provide the best chance for limb salvage [10]. There were several reports on arterial thromboembolic events; some were related with COVID-19 infection [11,12] (Unexpected Arterial Thrombosis and Acute Limb Ischemia in a Young Male Patient with COVID-19: A Case Report, n.d.) [13]. This case report was not related with COVID-19 infection.

Case Presentation

55-years-old chronic smoker had acute, severe pain in the right upper limb for one week; it was cold upto mid arm with skin discoloration. He also noticed numbness and weakness of movement of elbow joint. He underwent below elbow amputation in February 2023 for acute ischemia of left upper limb. He was a current chronic smoker; 15 pack year. General condition was weak; temperature was normal; blood pressure was 100/60mmHg; heart rate was 92/minutes with sinus rhythm; SpO_2 was 97% on air; heart was normal. In lower extremities, all peripheral pulses were intact. Local Examination of right upper limb revealed as follows: tenderness; coldness; discoloration; decreased motor function and sensory modalities. Axillary, brachial and radial pulses were not palpable. Hand-held Doppler failed to detect any signal in arterial system; therefore, we arranged for emergency embolectomy. complete occlusion of right upper limb arterial system Full blood count showed high hemoglobin (14.6gm%); normal total WBC and platelet count. Coagulation profile was normal. Parenteral unfractionated heparin, antibiotics, tramadol, proton-pump inhibitors, anti-platelets and HMG CoA reductase inhibitors were given. Doppler ultrasound demonstrated complete occlusion of right upper limb arterial system. CT Angiogram illustrated occlusion of subclavian artery downwards on both sides. Figures 1-14 shows complete occlusion of right subclavian artery without collaterals. On Day '2' of admission, the patient passed black tarry stool for 3 times. However, the vital signs were stable; blood pressure was 100/60mmHg; heart rate was 92/min; SpO_2 was 97% on air; the abdomen was soft and not tender. Above elbow amputation was done on Day '2' of admission. Intra-operative findings were as follows: (1) no active bleeding at brachial artery; (2) thrombosis along brachial artery; (3) muscle color and consistency were not healthy.

Then, the condition deteriorated rapidly; temperature 100˚F; the patient became oliguric; and, serum creatinine rose. Nephrologist opinion was Stage III AKI with sepsis and DIC; the renal team arranged for hemodialysis. Moreover, the patient had acute liver injury; he became jaundiced; serum bilirubin rose; and, ALT was more than 100 times normal (4289IU/L). Evidence of sepsis, DIC and acute kidney injury became more evident; neutrophil leukocytosis (total WBC $15x10^9$/L); platelets dropped to $94x10^9$/L; and, serum creatinine was 3.2mg%. Furthermore, the amputated wound was unhealthy; the color changed to brownish; it was having foul smelling discharge without active bleeding. Transthoracic echocardiogram showed dilated left atrium and left ventricle; LVEF was 48%; mild mitral regurgitation; and, no clot. Blood culture revealed Staphyloccus Capitis; sensitive to Gentamycin, oxacillin, ciprofloxacin, ceftriaxone, meropenum. Therefore, on Day '6' bone shortening of amputated stump was done by orthopedic surgeon; escalation of

antibiotics was done. The overall condition was poor. On Day '12', during 4th time hemodialysis, the patient had severe chest pain, dyspnea and sweeting; BP was 170/149mmHg; pulse rate was 120/ minutes; SpO_2 was not measurable; sudden cardiac arrest. There was no response to active resuscitation. As it happened suddenly within 5 minutes, ECG recording was not done. The clinical impression was either acute coronary syndrome or pulmonary embolism. In autopsy, coronary ostia were normal; no occlusion. It is shown in Figures 15-17 reveal acute kidney injury, normal size kidneys with normal cortex and medulla. Figure 18 demonstrates occlusion of superior mesenteric artery with thrombus; Figure 19 illustrates dis-colored caecum as a result of ischemia. Figure 20 reveals slightly enlarged liver with congestion compatible with acute liver injury. Figure 21 shows tar staining of both lungs. Figure 22 is the amputated stamp on right mid-arm; the color of muscle is brownish. There was no evidence of pulmonary embolism (Figures 23-28) (Table 1).

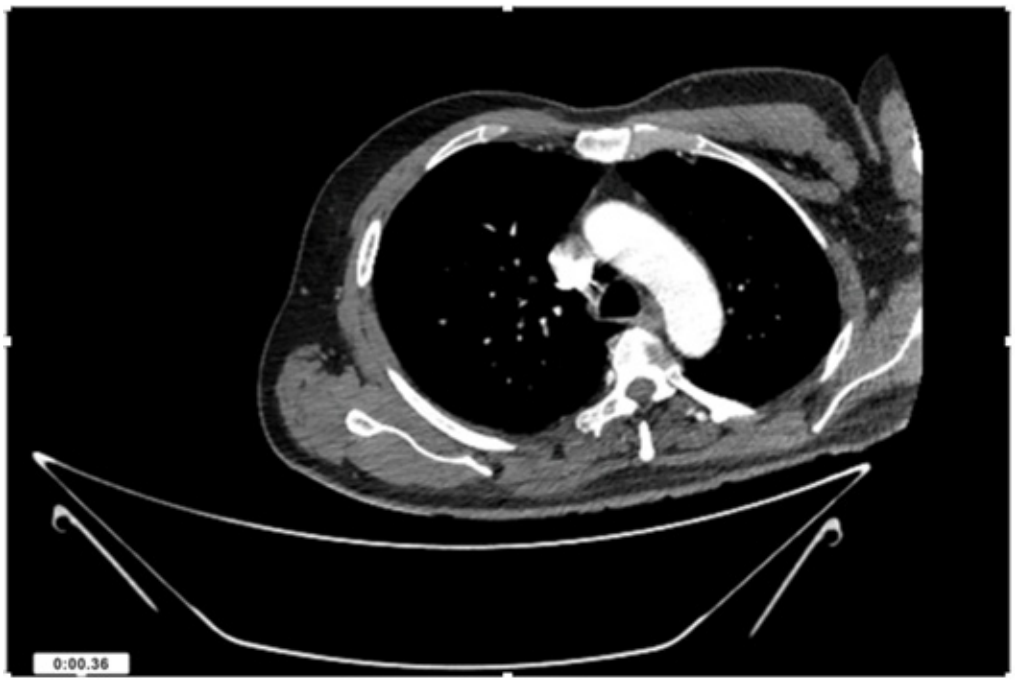

Figure 1: CT Angiogram at thorax showing normal arch of aorta.

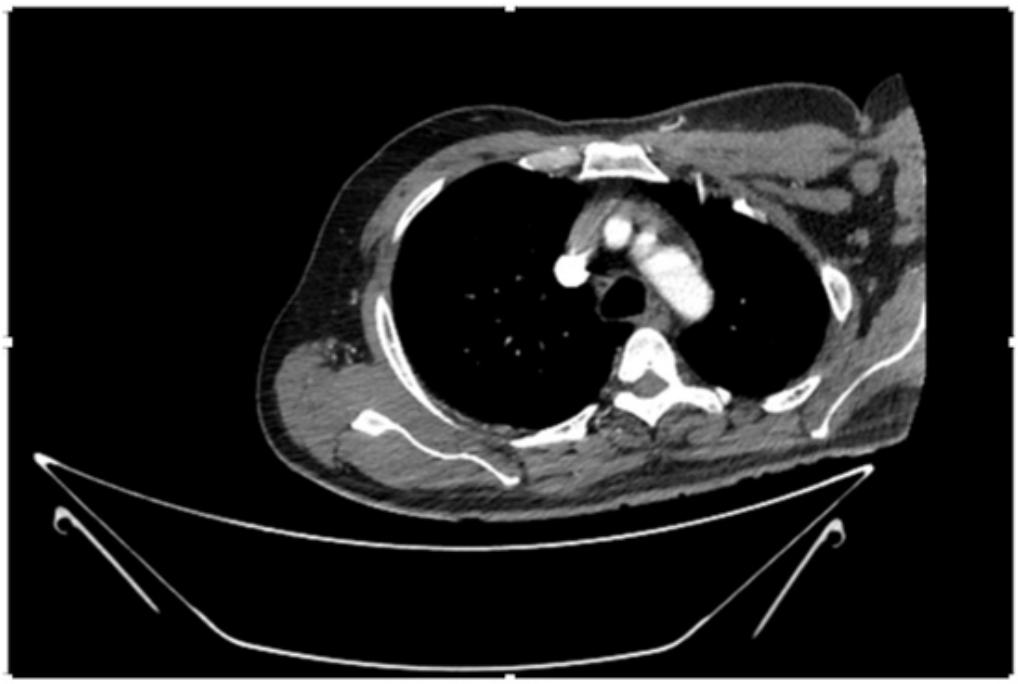

Figure 2: CT Angiogram at thorax showing normal main trunk.

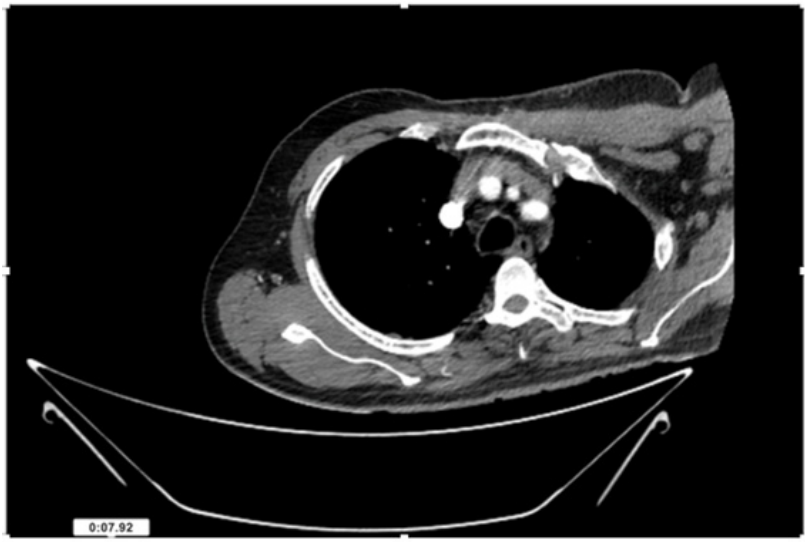

Figure 3: CT Angiogram at thorax showing normal main trunk.

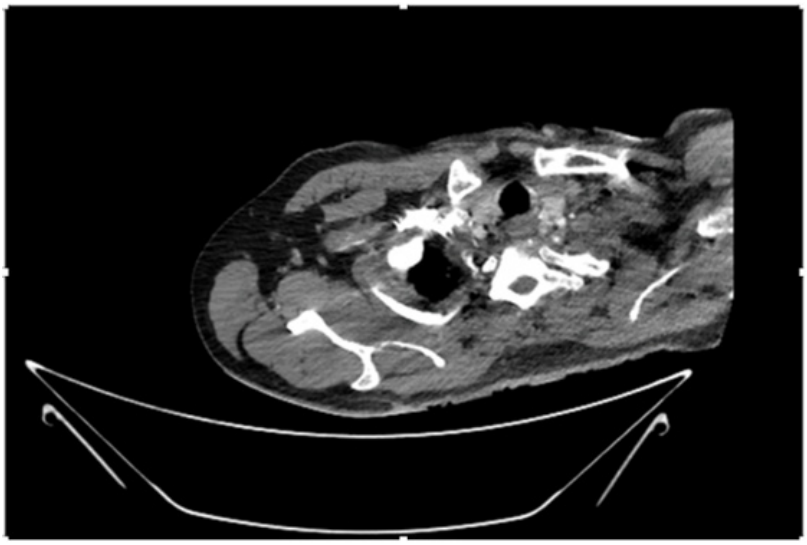

Figure 4: CT Angiogram at neck showing normal brachio-cephalic trunk, common carotid artery, and narrow right subclavian artery.

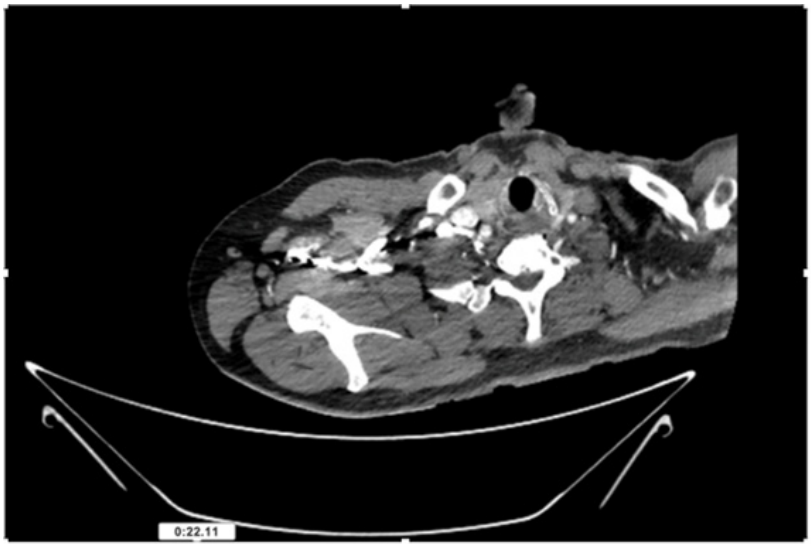

Figure 5: CT Angiogram at neck showing normal brachio-cephalic trunk, common carotid artery, and narrow right subclavian artery.

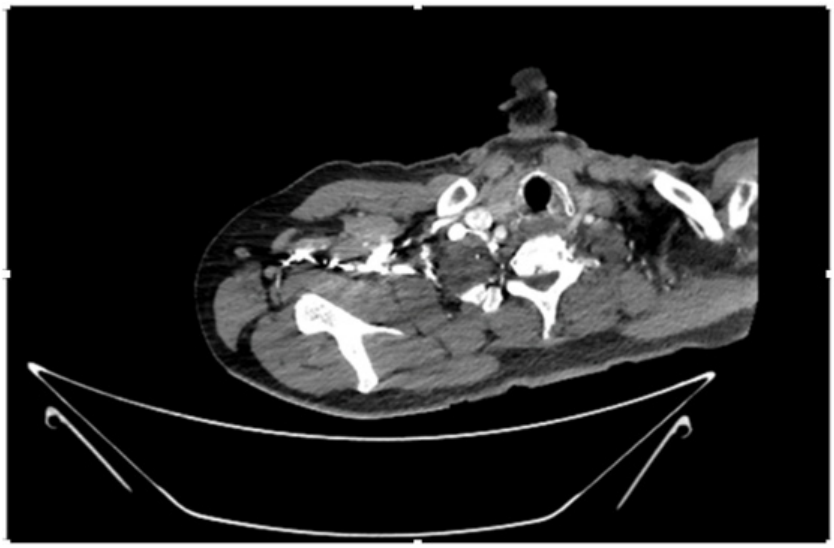

Figure 6: CT Angiogram at neck showing brachio-cephalic trunk, common carotid artery and narrow right subclavian artery.

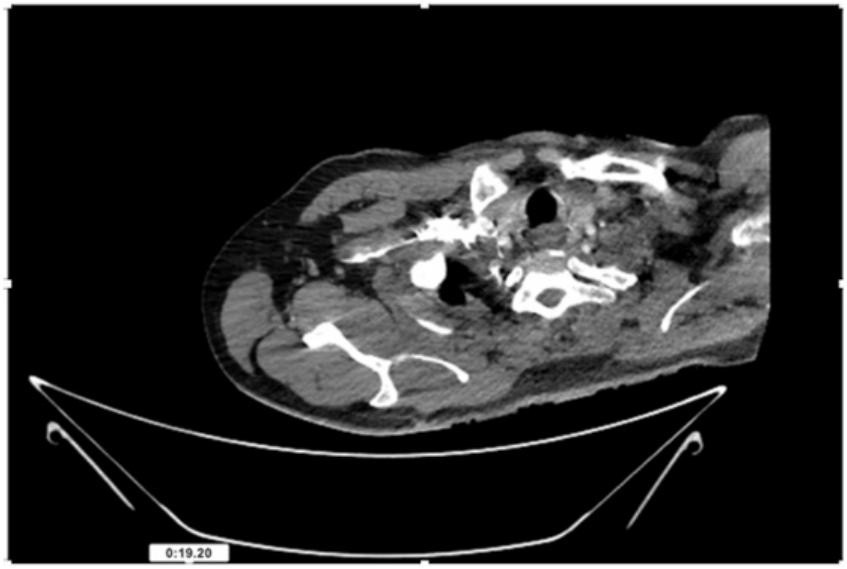

Figure 7: CT Angiogram at neck showing brachio-cephalic trunk, common carotid artery and narrow right subclavian artery.

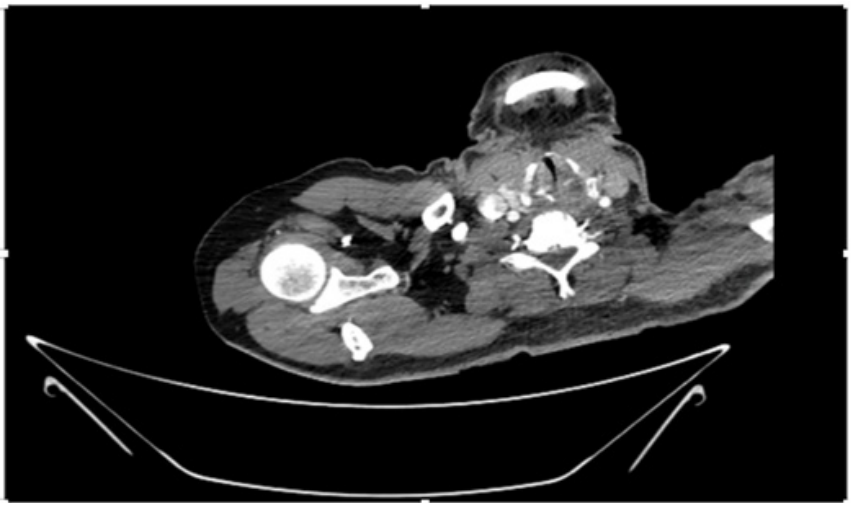

Figure 8: CT Angiogram at neck showing totally occluded right subclavian artery.

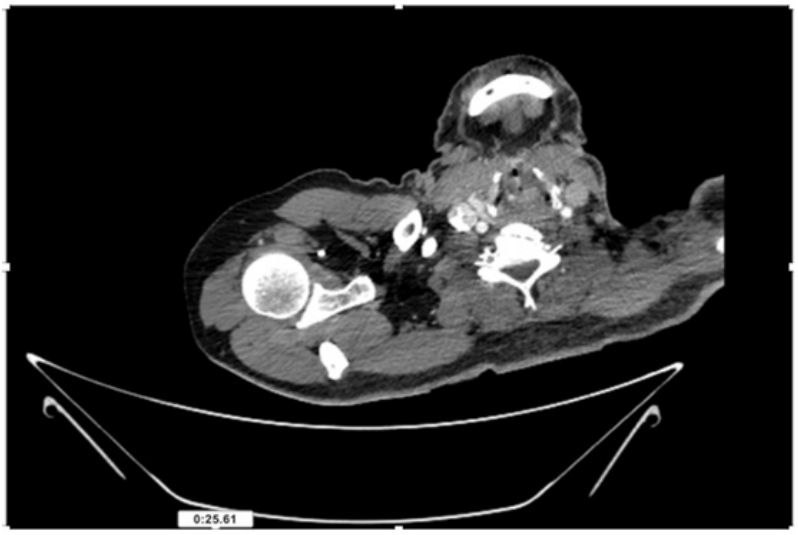

Figure 9: CT Angiogram at neck showing totally occluded right subclavian artery.

Figure 10: CT Angiogram at upper arm showing totally occluded right axillary artery; normal internal carotid artery and external carotid artery.

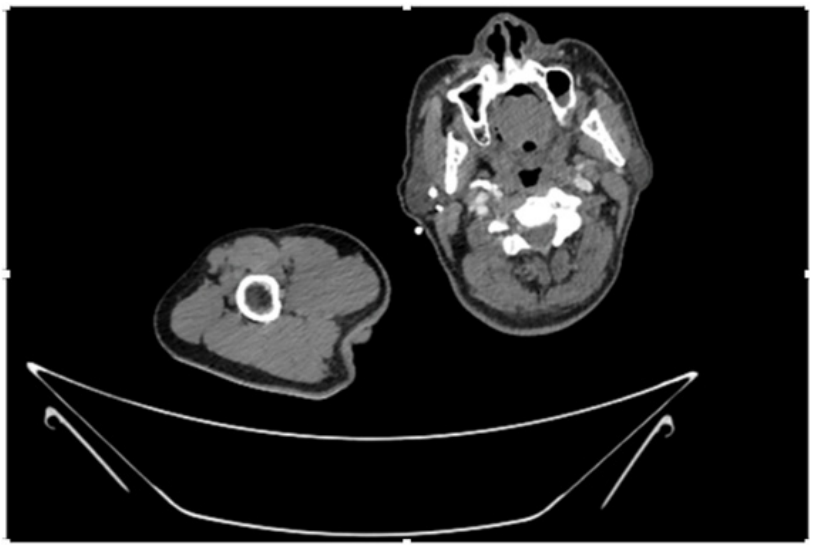

Figure 11: CT Angiogram at upper arm showing totally occluded right axillary artery.

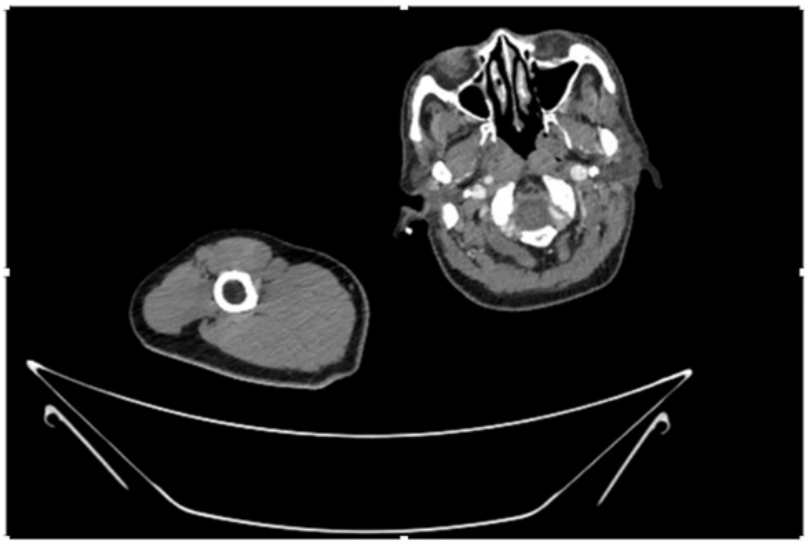

Figure 12: CT Angiogram at mid arm showing totally occluded right brachial artery.

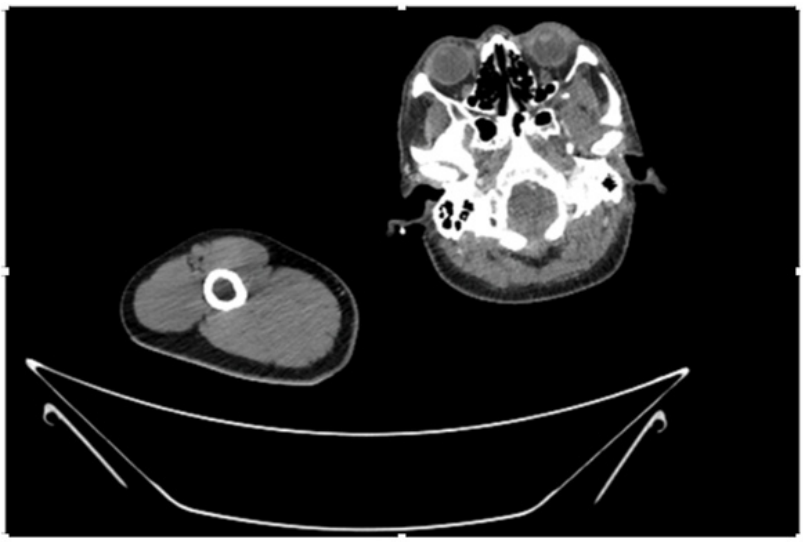

Figure 13: CT Angiogram at lower arm showing totally occluded right brachial artery.

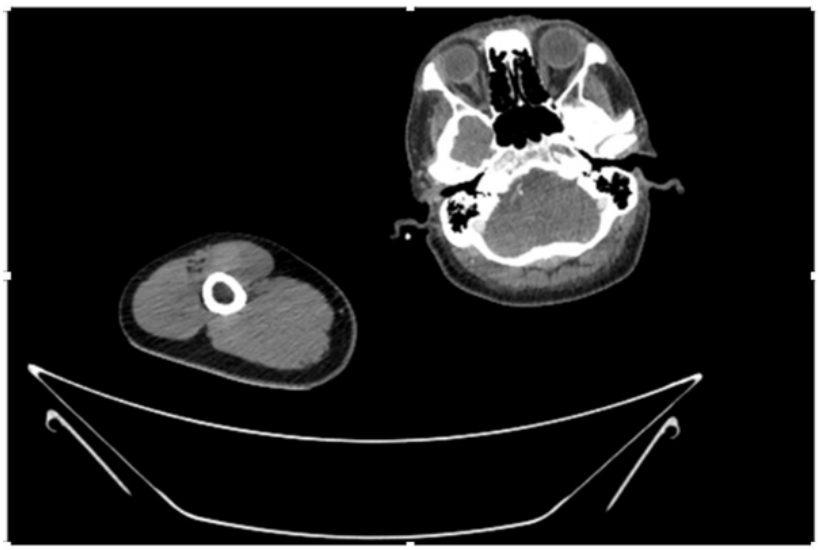

Figure 14: CT Angiogram at lower arm showing totally occluded right brachial artery.

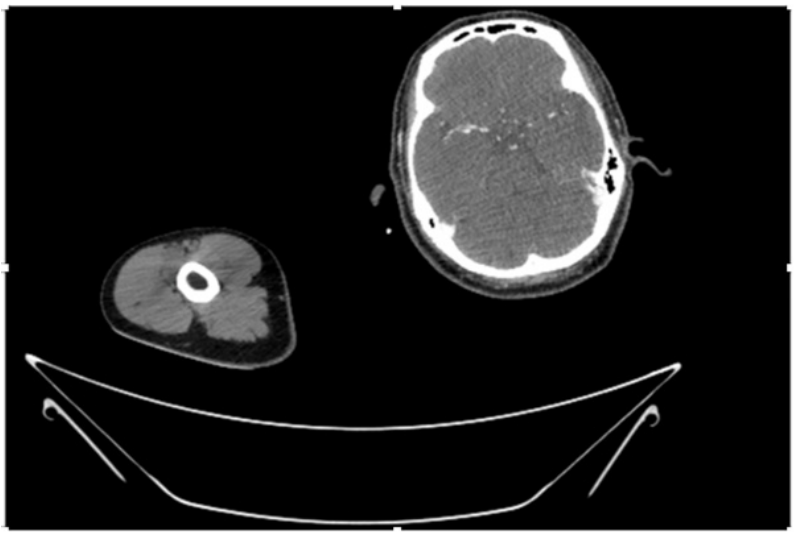

Figure 15: CT Angiogram at lower arm showing totally occluded right brachial artery.

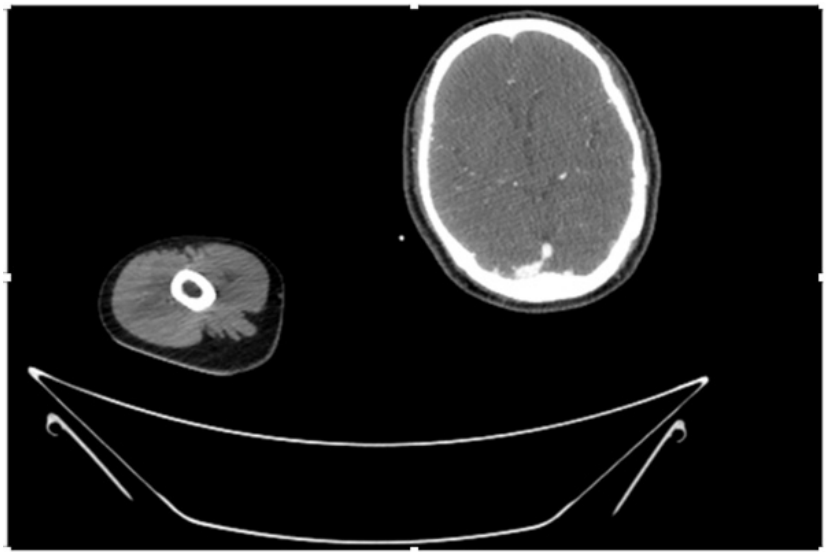

Figure 16: CT Angiogram at lower arm showing totally occluded right brachial artery.

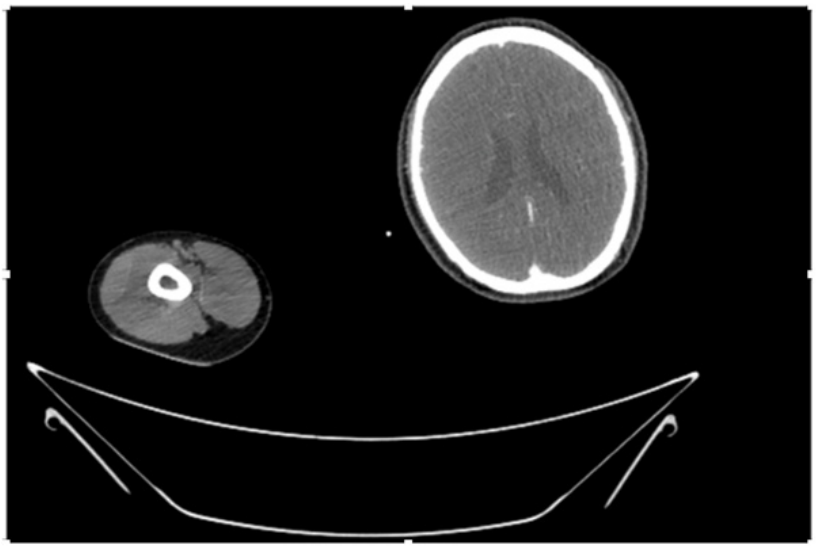

Figure 17: CT Angiogram at lower arm showing totally occluded right brachial artery.

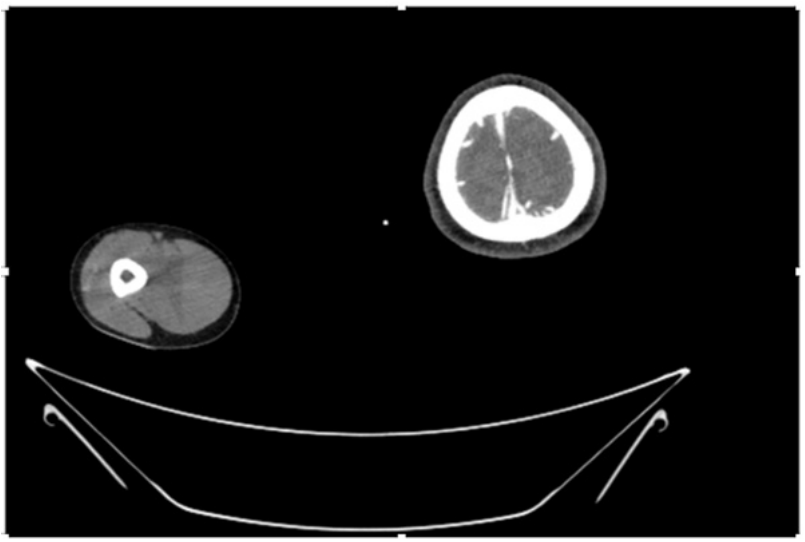

Figure 18: CT Angiogram at lower arm showing totally occluded right brachial artery.

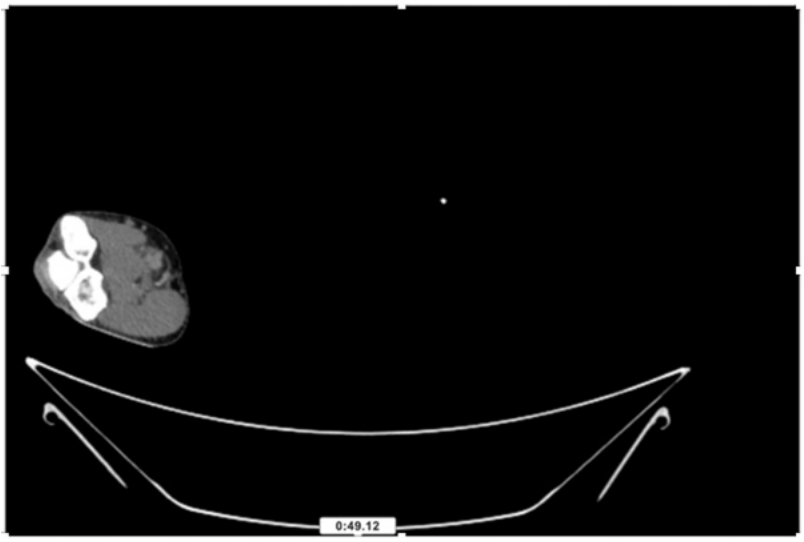

Figure 19: CT Angiogram at elbow joint showing totally occluded right brachial artery.

Figure 20(a): Autopsy of slightly enlarged heart and pericardium.

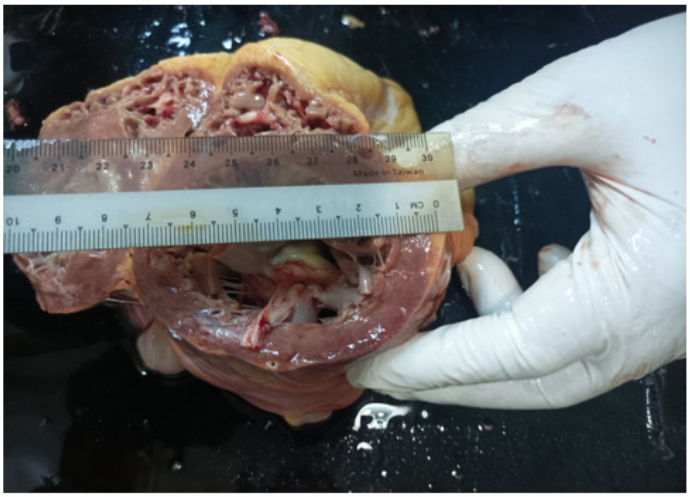

Figure 20(b): Cut section of heart showing dilated left ventricle and normal coronary ostia.

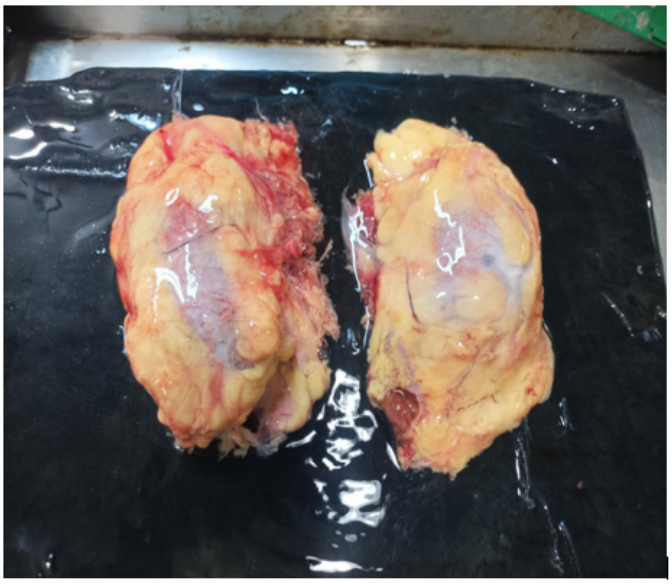

Figure 21: Normal size kidneys.

Figure 22: Cut section of kidneys showing normal cortex with distinct cortico-medullary junction

Figure 23: Finger is pointing to superior mesenteric artery occluded by thrombus.

Figure 24: Autopsy of lower abdomen showing discoloration of caecum, sequelae of occlusion of superior mesenteric artery.

Figure (25.a): Autopsy of external surface of stomach.

Figure (25.b): Autopsy of interior surface of stomach, normal.

Figure (26.a): Mildly enlarged liver weighing 2.5 gm.

Figure (26.b): Cut section of liver reveals mild congestion.

Figure 27: Autopsy of lungs showing heavily stained nicotine.

Figure 28: Amputated right stamp in autopsy showing unhealthy muscles having brownish color.

Table 1: Serial laboratory parameters.

Day	Day '0'	Day '3'	Day '5'	Day '6'	Day '7'	Day '9'	Day '11'
Hb (gm%)	14.2	15.3	14.1	12.9	12.8	**11.8**	7
PCV (%)	45	43	39	41	40	34	21
TWBC ($X10^9$ /L)	8.2	15.3	9.6	9.8	10.1	16	21.8
Neutrophils (%)	76	91	92	87	88	85	88
Platelets ($X10^9$ /L)	224	**94**	**110**	207	243	321	374
PT (sec)	10.5	20.6				12.1	
INR	0.7	1.72				0.9	

Urea (mmol/L)		65	178	202	95	160	150
creatinine (umol/L)	0.73	**3.05**	**7.2**	**7.95**	**5.8**	**8.3**	**7.9**
Na+(mmol/L)	131	128	126	126	131	131	124
K+(mmol/L)	3.2	3.3	4.3	4.4	4	4.5	5.2
Cl+(mmol/L)	86	83	86	86	92	91	88
Bilirubin (mg/dL)		**2.4**	**1.9**	**1.8**		**1.2**	
ALT (IU/L)		**4288**	**1676**	**919**		**212**	
AST (IU/L)			**1099**	**434**		**146**	
ALP (IU/L)		168	168	**271**		**374**	
rGT (U/L)		186		**526**		**709**	
Cholesterol (mg%)		110		78		101	
Uric acid (3.4-7mg/dl)	**8.9**	**12.9**		**14.9**		**10.3**	
LDH (U/L)		**1042**				**571**	
(U/L)						**7845**	

Discussion

This patient had history of acute limb ischemia of left upper limb for which he underwent below elbow amputation one year ago. Present problem was again for acute limb ischemia of right upper limb. The risk factor for thrombosis was chronic heavy smoking and the old age-55 years. His blood pressure was normal; blood cholesterol level was normal too. This patient had modifiable risk factor i.e smoking. If the patient quit smoking, he would not face the problem of ischemia on right upper limb. It indicates that we need to upgrade 'smoking cessation program'. Non-traumatic ischemia of the lower extremities is more common than the upper extremities and is more likely to result in limb loss [14,2]. In this patient, the reverse was happening; there was no history of trauma. This is one reason for case reporting. The incidence of acute peripheral arterial occlusion causing acute lower extremity ischemia is approximately 1.5 cases per 10,000 persons per year [1]; the prevalence rises with age [2]. This patient was only 55 years old; the median age prevalence of atherosclerosis in UK was 75 years. We should aware of prevalence of premature atherosclerosis in Myanmar.

The management of acute limb ischemia is advancing; it includes surgical or catheter-based thromboembolectomy, bypass grafting, thrombolytic therapy, endovascular revascularization and percutaneous transluminal angioplasty [3-8]. Nonetheless, the morbidity, mortality, and limb loss rates remain high [9]. For limb salvage, early diagnosis and rapid initiation of therapy are essential [10]. This patient had early diagnosis and received medical treatment (heparin, antiplatelets and lipid lowering agents) as well as surgery timely. Because of ongoing ischemia even after above elbow amputation, the wound was not healthy. And it was added by infection and multi-organ failure; sepsis, DIC, acute kidney injury, and, acute liver injury. The subclavian artery was totally thrombosed; however, we did not have facility for endovascular revascularization. He would have survived if we had done disarticulation of shoulder joint. Takeuchi et al mentioned one case where they did disarticulation of hip joint in view of severity of ischemia and irreversible limb paralysis in acute ischemia of lower limb in patient with COVID-19 infection [15]. The patient had sudden onset of severe chest pain during hemodialysis followed by sudden death. Patency of coronary ostia, normal myocardium and having thrombus in superior mesenteric artery in autopsy indicated that the pain from acute superior mesenteric artery occlusion was referred to precordium as chest pain; mimicking either acute coronary syndrome or massive pulmonary embolism. There were features of acute gangrene of colon in autopsy. Blood supply of colon was from superior mesenteric artery; therefore, it was the sequelae of occlusion of superior mesenteric artery. Atherosclerosis is a multisystem disorder; there may be simultaneous involvement of median and small arteries. It is important to have awareness on multiorgan involvement in atherosclerosis. This case highlighted generalized atherosclerosis; limb and viscera.

COVID-19 is associated with high risk of thrombotic complications. There were several reports on patients with COVID-19 infection having arterial thromboembolic events [11,12] (Unexpected Arterial Thrombosis and Acute Limb Ischemia in a Young Male Patient with COVID-19: A Case Report, n.d.) [13]. In the study by [16], patients with COVID-19 infection were diagnosed by doing IgG and IgM level by immunochromatographic method; their patients had combined ischemia of limb, intercostal arteries and superior mesenteric artery. Blood IgG or IgM of SARSCov-2 indicate chronic infection and acute infection respectively. This patient did not show nasopharyngeal swab for PCR of SARSCov-2; therefore, he did not have acute COVID-19 infection. However, we could not test blood level of IgG or IgM of SARSCov-2. In COVID-19 era, he might have positive IgG of SARSCov-2 which could aggravate thrombosis. Acute mesenteric ischemia is a group of diseases characterized by an interruption of the blood supply to varying portions of the intestine, leading to ischemia and secondary inflammatory changes. If untreated, this process may progress to life-threatening intestinal necrosis. The incidence of acute mesenteric ischemia is low; 0.09-0.2% of all acute surgical admissions. However, its prevalence increases with age. This patient was not old; 55 years. It is one reasons for case reporting. Although acute mesenteric ischemia is an

uncommon cause of abdominal pain, awareness is extremely important. Because the mortality is 50% if untreated [17] (Trends in Population-Based Incidence, Diagnostics, and Mortality of Acute Superior Mesenteric Artery Occlusion, n.d.) [18-24]. Physicians should consider acute mesenteric ischemia if the patient has severe abdominal pain particularly in those with COVID-19 infection [25]. Therefore, we should have awareness on mesenteric ischemia in COVID-19 era. In this patient, acute severe chest pain was referred pain from mesenteric artery occlusion; and, cardiac arrest was within very short period. This case report was a good example for causes of severe chest pain referred from abdomen [26-28].

Conclusion

Acute ischemia of upper limb is not uncommon particularly in COVID-19 era and it is surgical emergency. It has very high morbidity and mortality. It should be managed by multidisciplinary team including vascular surgeon, orthopedic surgeon, interventional radiologist, general physicians, nephrologist, hematologist, intensive care physician and hepatologist. Simultaneous ischemia of other median size and small arteries causing chest pain or acute abdomen may give rise to another medical or surgical emergency. Smoking is a modifiable risk factor for atherosclerosis and smoking cessation program should be encouraged.

Statement of Informed Consent

Informed consent was also taken from the relatives of patient.

Acknowledgments

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Disclosure of Conflict of Interest

The authors declared no potential conflicts of interests with respect to authorship and publication of this article.

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