

## A probe to diagnose the mis-diagnosis of acute limb ischemia

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**Received:**  
15th December, 2018

**Accepted:**  
7th July, 2019

### Abstract

**Objective:** The aim of this study was to see the level of awareness and existing practices of health care providers in Acute Limb Ischemia (ALI).

**Study design:** Cross sectional descriptive study

**Place and duration of study:** Feed back of different doctors working across the country from March 2018 to October 2018

**Material and Methods:** An online questionnaire regarding the early diagnosis and management of acute limb ischemia was designed. It was sent to doctors from all over the country via social media like WhatsApp and messenger and they were requested to answer according to their daily practice.

**Results:** 350 responses were received. 36.3% from residents, 35.3% from consultants, 19.4% from general practitioners and 9% from house officers. 84% doctors think of acute limb ischemia in every limb pain while 16% do not think acute limb ischemia. 79.7% expose the limbs while 20.3% do not expose the limb. 92% palpate the limb while 8% do not palpate the limb. 69.4% check the pulses while 30.6% do not check the pulse. 76.6% suspect acute limb ischemia in cardiac patients with limb pain while 23.4% do not. 34% suspect acute limb ischemia in patient with history of sciatica while 66% do not think ischemia. 70.6% check the pulses in limb trauma while 29.4% do not check the pulse. 87.7% perform arterial doppler while 12.3% do not perform arterial doppler. Majority of the doctors (83%) give stat heparin while shifting but 17% do not. 93% doctors do proper counselling while 7% do not do the proper counselling.

**Conclusion:** The health care providers should keep acute limb ischemia on the top of their differential list whenever they encounter a patient with sudden onset of limb pain.

**Keywords:** Acute Limb Ischaemia; amputation; missed diagnosis, doppler ultrasound, thrombo-embolism, amputation

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### Introduction:

Acute limb ischemia (ALI) is a condition that develops following a sudden cessation of blood supply to a limb. It causes a threat to the limb viability and failure to identify it in time can be catastrophic for the patient in terms of limb and life loss.<sup>1</sup> The common causes of acute limb ischemia are embolism, thrombosis, peripheral aneurysm with thrombo-embolism, acute graft occlusion, iatrogenic and trauma. Depending upon the type of occlusion and viability of the

limb, surgical management of ALI include open surgery like thrombo-embolism with Fogarty's catheter ± fasciotomy, bypass surgery or endovascular management with catheter directed thrombolysis.<sup>2,3</sup>

Traditionally, revascularization within 6 hours of the onset of the symptoms of ALI is considered to be the best in terms of limb salvage and to avoid re-perfusion injury. Despite that, quite a big number of patients with ALI don't reach to the vascular surgeon in this critical window

Table-1: Questionnaire with results

	QUESTIONS	YES	NO
1	Does the sudden onset of severe limb pain describe by the patient in history, provokes the diagnosis of ALI in your mind?	294 (84%)	56 (16%)
2	Do you expose the limbs of every patient for inspection who present to you with limb pain?	279 (79.7%)	71 (20.3%)
3	Do you palpate/touch the limb of a patient with pain to feel the temperature difference?	322 (92%)	28 (8%)
4	Do you check the peripheral pulses in every patient who present with limb pain?	243 (69.4%)	107 (30.6%)
5	Do you suspect ALI in a patient of known ischemic heart disease presenting to you with limb pain?	268 (76.6%)	82 (23.4%)
6	Do you suspect ALI in a patient with known lumbago/sciatica who present with pain in the same limb?	120 (34%)	230 (66%)
7	Do you check all peripheral pulses in every case of poly-trauma?	247 (70.6%)	103 (29.4%)
8	Do you send the clinically diagnosed/ suspected case of ALI for urgent arterial doppler?	307 (87.7%)	43 (12.3%)
9	Once diagnosed as ALI; do you refer the patient to a tertiary care/ vascular center with a stat dose of anticoagulant?	290 (83%)	60 (17%)
10	Once diagnosed as ALI; do you explain the urgency of the situation, the risk of imminent amputation and push the attendants for immediate consultation from tertiary care/ vascular center?	326 (93%)	24 (7%)

of 6 hours.<sup>4</sup> This delay may be present at different levels, including patient delay, failure of the primary physician to diagnose ALI, delay in referring the patient to the proper facility, delay in the emergency department, waiting for diagnostic imaging and delay in shifting to the operating theatre. Any undue delay in the management of acute limb ischemia increases the risk of amputation and places the patient life at risk.<sup>5,6</sup>

The aim of this study was to look into the reasons of delayed presentation of acute limb ischemia. Majority of the patients which we receive in the ER labeled as acute limb ischemia had been seen initially by some health care provider before reaching to us. Despite initial consultation by a doctor, why these patients still present late? Is there any delay on the part of the health care providers or the patients? We devised an awareness proforma, circulated among doctors and took feedback of their practices regarding management or referral of acute limb ischemia patients. The results are hereby presented. The theme of the study is that before creating strategies for reducing the delay in treatment of acute limb ischemia patients, the existing problems need to be identified.

**Material and Methods:**

This cross-sectional study was performed from March 2018 to October 2018 by taking feedback from different doctors working across the country at different level. An online questionnaire (table-1) was generated which contained 10 easy to answer questions. These included questions related to signs and symptoms, initial management, referral and counselling of patients presenting to them with acute limb ischemia. Doctors all over Pakistan from house officers to consultants working at different levels of health care facilities including basic health units, tehsil, district headquarters, private hospitals/clinics and tertiary care centers were consulted. The online questionnaire was sent to them via social media like WhatsApp and messenger and they were asked to be true in their answers according to their daily practice. The results so collected is presented in Microsoft excel.

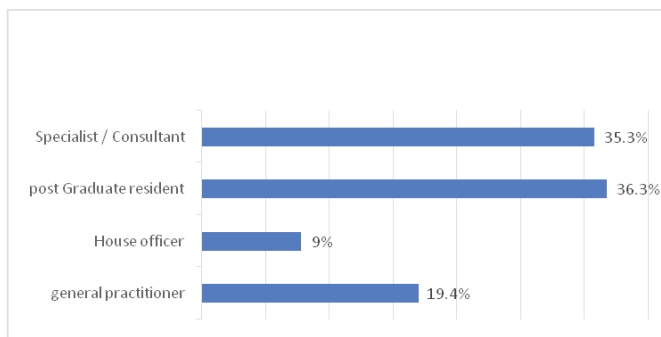


Figure. 1: levels of health care providers

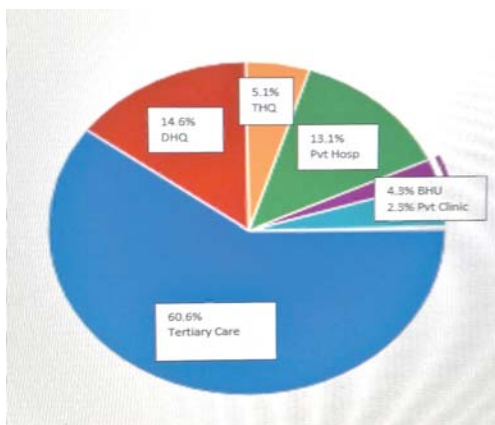


Figure. 2: Hospital levels

**Results:**

A total of 350 responses were received from all over the country. Among them, 127(36.3%) were from post-graduate residents and 124(35.3%) from consultants, 68(19.4%) from general practitioners and 31(9%) responses were from house officers. Residents participated the most in our study. This is shown in chart 1. These doctors were working at different level of health facilities. 212(60.6%) were working at tertiary care hospitals, 51(14.6%) at District headquarter hospitals, 46(13.1%) at private hospitals, 18(5.1%) at Tehsil head quarter hospitals, 15(4.3%) at basic health units and 8(2.3%) at private clinics. The participation from tertiary care hospital was the most. This is shown in chart 2. If we see specialty wise, then people from General surgery participated the most followed by general medicine. 116(33.1%) responded from general Surgery, 57(16.3%) from general Medicine, 25(7.1%) from Orthopedics, 17(4.9%) from peadiatrics, 7(2%) from Neurosurgery, 9(2.6%) from Cardiology and 119(34%) from miscellaneous specialties like plastic surgery, urology, rheumatology, dermatology, cardiac surgery, vascular surgery and neurology.

The first question was, does the sudden onset of severe limb pain provokes the diagnosis of acute limb ischemia in your mind? 294(84%) people said yes and 56(16%) said no. The second question was do you expose every painful limb for inspection? 279(79.7%) people do so while 71(20.3%) do not. The third question was about palpation of the painful limb to feel for the temperature difference. 322(92%) people responded that they palpate the limb while 28(8%) said that they do not. The fourth question was about checking the pulses; 243(69.4%) check the pulses in every painful limb while 107(30.6%) people do not. The fifth question was about the suspicion of acute limb ischemia in a known cardiac patient with limb pain. 268(76.6%) suspect while 82(23.4%) do not. The sixth question was about suspicion of acute limb ischemia in a patient with known lumbago (sciatica) presenting with pain in the ipsi-lateral limb. 120(34%) do suspect limb ischemia in such scenario while

230(66%) don't.

The seventh question was about checking the peripheral pulses in every case of poly-trauma. 247(70.6%) responded that they check the pulses in every case while 103(29.4%) said they do not. The eighth question inquired about urgent arterial doppler in every case of acute limb ischemia. 307(87.7%) do so while 43(12.3%) do not. The ninth question was about giving heparin to a case of acute limb ischemia while referring. 290 (83%) people said yes, they give heparin while 60(17%) people said they do not. The last question was about the counselling of the patient and attendants regarding the disease condition and its urgency. 326(93%) people said they do it while 24(7%) said they do not.

**Discussion:**

Acute limb ischemia is a limb and life-threatening condition which needs an early recognition and rapid institution of treatment in order to minimize the tissue ischemia time. It has been observed that there is a lack of awareness in patients as well doctors regarding the importance of time in acute limb ischemia, which leads inadvertently to wastage of time and delay in reperfusion. Time means tissue in acute limb ischemia and any delay in the treatment pathway can lead to amputation and even death of the patient.<sup>6-8</sup>

If we compare acute limb ischemia to Myocardial ischemia (MI), they are both time sensitive ischemic events and delay in managing both can have catastrophic effects. Fortunately, Myocardial ischemia care has been more standardized and the importance of time has been well highlighted both to the patients and health care providers. This awareness of Myocardial ischemia has led to the better results in its management. Unfortunately, this is not the state of affairs with acute limb ischemia. The theme of rapid reperfusion and institution of treatment protocols early in acute limb ischemia just like Myocardial ischemia has yet more to be addressed.<sup>9-11</sup> The aim of our study was to see how much rapidly our health care providers diagnose acute limb ischemia and whether they show the same urgency in its management which is actually needed, just

like Myocardial ischemia or not.

Acute limb ischemia patients have a 30-day mortality of about 15-25% and a major amputation rate of about 10-15%. There are a lot of independent factors in these patients which contribute to poor outcome. These include co-morbidities, old age and poor medical optimization. These factors cannot be modified. What we can modify is, avoiding delay in consultation, early diagnosis and institution of treatment.<sup>12-14</sup> The delay in presentation can be avoided by educating the masses. Different modes of communication like internet, newspapers, social media, campaigns and pamphlets can be used to spread awareness about this disease. The commonest symptoms like sudden onset of limb pain, coldness and pallor should be highlighted to them and they should be advised not to take any severe limb pain lightly. They should immediately report to the hospital in case of any such symptoms. Similarly, our health care providers should be reminded that they should always remember acute limb ischemia while seeing a patient with limb pain. If it's on your mind, only then it can be diagnosed. Otherwise it will be missed.

Missed diagnoses of acute limb ischemia are common worldwide. National Health Service litigation authority, the Medical Defence Union, and the Medical Protection Society identified 224 cases of acute limb ischemia leading to limb loss over a 10-year period. 51 cases were reported to the National Reporting and Learning System between 2003-2010 in which the diagnosis and treatment of acute limb ischemia was delayed. Medicolegal data show that more than 20 legal actions are initiated each year in the UK related to acute limb ischemia, with delay in diagnosis or treatment.<sup>15</sup>

Literature search shows different reasons why the diagnosis of acute limb ischemia is being missed. These includes diagnostic errors (such as misdiagnosis as myalgias, sciatica, osteoarthritis, monoplegia), acute limb ischemia not being recognized as a surgical emergency, failure to consider a diagnosis of acute limb ischemia under 60 years, missing subtle signs like

mild pallor and coldness and mis-interpreting the pulse to be present or weak which in fact is absent.<sup>15</sup> Pulse palpation is not a very reliable physical sign, with a false positive palpation in 14% of cases assessed by non-specialists. A weak ankle pulse or one which the doctor thinks he or she can feel, is probably not present at all. There is a simple rule: "If you can feel a pulse you can count it; if you cannot count it, you are not feeling it."<sup>16</sup>

The situation in Pakistan is not much different from the rest of the world regarding delay in consultation and diagnosis of acute limb ischemia. We see patients presenting late with unsalvageable limbs whose diagnosis is missed despite consultation with a doctor. The situation is not satisfactory and we need to look into the matter seriously. The proforma which we devised included simple questions related to the diagnosis of acute limb ischemia. The aim was to see whether our doctors consider acute limb ischemia in their differential diagnosis while dealing with a patient having limb pain, do they understand the urgency of the situation after diagnosis and is the initial management which they offer is according to the standards?

Three questions were related to suspecting acute limb ischemia in a patient with limb pain. Majority of the doctors (84%) suspect acute limb ischemia in limb pain while 16% do not. 76.6% suspect acute limb ischemia in known cardiac patients while 23.4% do not. The commonest cause of acute limb ischemia is underlying heart disease and there should be a high degree of suspicion in cardiac patients presenting with limb pain.<sup>17</sup> It is good to see in our result that most of the doctors do suspect ischemia in such cases. Still a small no doesn't and this need to be addressed by spreading more awareness. When patient with known sciatica/lumbago present with a limb pain, doctors are usually preoccupied with the already existing diagnosis and they most of the time (66%) don't think that an acute limb ischemia can occur coexisting with sciatica. 34% still consider acute limb ischemia in such cases. The symptoms of ischemia should be differentiated from neurogenic pain by detailed



history and a proper examination carried out in order to avoid such mistake.

Four questions were related to the examination of a painful limb. Pallor; visible on exposing the limb, coldness; appreciated on touching the limb and pulse assessment are vital points in making a diagnosis of acute limb ischemia. 20.3% do not expose the limb and hence pallor is missed. 8% do not touch the limb and hence temperature difference is missed. 30.6% do not assess the pulse in suspected acute limb ischemia. Again, here the reason is that limb ischemia is not on their differential list. The 6 'P's can only be appreciated if you properly expose and touch the limb.<sup>18</sup> Similarly, suspecting vascular injury is very important in trauma patient with limb injuries.<sup>19</sup> In our study we noticed that 29.4% doctors miss pulse assessment in a limb trauma. It is quite a big percentage which can lead to preventable limb losses and can be avoided by adhering to the standard protocols of history and examination.

The last three questions were related to investigations and management. 12.3% doctors send the patient for urgent arterial doppler when they suspect acute limb ischemia. Arterial doppler examination is an important adjunct in these patients if it is readily available and the process does not waste precious time.<sup>20</sup> Although its importance cannot be denied, we think that in clear cases of clinically diagnosed acute limb ischemia, time should not be wasted unnecessarily on performing doppler. Majority of our hospitals do not have this facility available 24/7 and if available its not bedside. Shifting the patient for an arterial doppler often waste a lot of precious time. So, it should be reserved for suspicious cases only. A stat dose of anti-coagulant is very important in acute limb ischemia especially if the patient is being referred to a specialized unit. 17% misses giving this stat dose. Counselling of the patient regarding the disease condition and the urgency of the situation is very important especially if the patient is referred to a tertiary care so that he may not waste further time. Majority of our doctors do such counselling. Only 7% misses this step.

Majority of the responses which we got were from tertiary care. Post-graduate residents and consultants participated the most. Although the responses were not disappointing regarding the diagnosis and management of acute limb ischemia, still there is a space for further awareness to improve the prevailing situation.

#### **Conclusion:**

Acute limb ischemia needs early diagnosis and urgent intervention to save the limb and life of the patient. The health care providers should keep acute limb ischemia on the top of their differential list whenever they encounter a patient with sudden onset of limb pain. Much more awareness is needed to minimize the rate of misdiagnosis of limb ischemia.

**Conflict of interest:** None

**Funding source:** None

#### **Role and contribution of authors:**

Dr Humera Latif, collected the data, referenes and did the initial writeup

Dr Kishwar Ali, collected the data and hlepded in introduction writing

Dr Hafiz Khalid Parvaiz Butt, critically review the article and did the final correction

#### **References:**

1. McNally MM, Unvers J. Acute Limb Ischemia. Surg Clin North Am. 2018;98(5):1081-1096.
2. Van DH, Boesmans E, Defraigne JO. [Acute limb ischemia]. Rev Med Liege. 2018;73(5-6):304-311
3. Simon F, Oberhuber A, Floros N, et al. Acute Limb Ischemia—Much More Than Just a Lack of Oxygen. International Journal of Molecular Sciences. 2018;19(2):374.
4. KhanMI, Nadeem IA. Revascularizationof LatePresenting Acute Limb Ischaemia And Limb Salvage.J Ayub Med Col-IAbbottabad. 2016;28(2):262-66
5. Londero LS, Nørgaard B, Houliand K. Patient delay is the main cause of treatment delay in acute limb ischemia: an investigation of pre- and in-hospital time delay. World J Emerg Surg. 2014; 5;9(1):56.
6. Normahani P, Standfield NJ, Jaffer U. Sources of Delay in the Acute Limb Ischemia Patient Pathway. Ann Vasc Surg. 2017;38:279-285.
7. Norgren L, Hiatt WR, Dormandy JA, et al. Inter-Society-Consensus for the Management of Peripheral Arterial Disease(TASC II).J Vasc Surg 2007;45:55e67.
8. Morris-Stiff G, D'Souza J, Raman S, et al. Update experienceof surgery for acute limb ischaemia in a district gen-

- eral hospital are we getting any better? *Ann R Coll Surg Engl* 2009;91:637e40
9. Bradley EH, Curry LA, Webster TR, et al. Achieving rapid door-to-balloon times: how top hospitals improve complex-clinical systems. *Circulation* 2006;113:1079e85
  10. Freemantle N, Ray D, McNulty D, et al. Increased mortality associated with weekend hospital admission: a case for expanded seven day services? *BMJ* 2015;351:h4596.
  11. Puymirat E, Simon T, Steg PG, et al. Association of changes in clinical characteristics and management with improvement in survival among patients with ST-elevation myocardial infarction. *JAMA* 2012;308:998e1006.
  12. Eliason JL, Wainess RM, Proctor MC, et al. A national and single institutional experience in the contemporary treatment of acute lower extremity ischemia. *Ann Surg* 2003;238:382e9. discussion 389e390.
  13. Baril DT, Patel VI, Judelson DR, et al. Outcomes of lower extremity bypass performed for acute limb ischemia. *J Vasc Surg* 2013;58:949e56.
  14. Gunawansa N. A traumatic acute limb ischemia, clinical presentation, classification, assessment and management: A review. *J Vas Dis Treat.* 2017;1(1):10-15.
  15. Brearley S. Acute leg ischaemia. *BMJ.* 2013 May 8;346:f2681.
  16. Brearley S, Shearman CP, Simms MH. Peripheral pulse palpation: an unreliable physical sign. *Ann Roy Coll Surg Engl* 1992;74:169-71
  17. Ikramullah, Ilyas M, Malik A, Ahmad F, Ali U. Causes of acute limb ischemia and its in hospital outcome. *Pak Heart J* 2016;49(02): 76-80
  18. Ram BL, George RK. Nontraumatic acute limb ischemia – presentation, evaluation, and management. *Indian J Vasc Endovasc Surg* 2017;4:192-7.
  19. Khan FH, Yousuf KM, Bagwani AR. Vascular injuries of the extremities are a major challenge in a third world country. *J Trauma Manag Outcomes.* 2015 Jul 30;9:5.
  20. Gunawansa N. Initial clinical assessment of non-traumatic acute limb ischaemia: A high degree of suspicion is pivotal in timely intervention. *J Vas Dis Treat.* 2018;2(1):04-08.