Clinical Research on Foot & Ankle

Filis et al., Clin Res Foot Ankle 2015, 3:2
http://dx.doi.org/10.4172/2329-910X.1000e106

Editorial Open Access

The Diagnostic and Predictive Role of Ankle-Brachial Index in Clinical Practice

Filis K, Galyfos G* and Sigala F

Vascular Division, First Department of Propaedeutic Surgery, University of Athens Medical School, Hippocration Hospital, Athens, Greece

***Corresponding author:** George Galyfos, Vascular Division, First Department of Propaedeutic Surgery, University of Athens Medical School, Hippocration Hospital, Athens, Greece, Tel: +30-213-2086243; Email: georgegalyfos@hotmail.com

Received date: Aug 14, 2015; **Accepted date:** Aug 22, 2015; **Published date:** Aug 24, 2015

Editorial

Peripheral artery disease (PAD) has been associated with specific risk factors such as smoking, diabetes mellitus (DM) as well as previous coronary and cerebrovascular disease [1]. Data show that the distribution, extent, and progression of PAD are influenced by cardiovascular risk factors although the findings are not consistent [2]. PAD prevalence and incidence are both sharply age-related, rising >10% among patients in their 60s and 70s [1]. With aging of the global population, it seems likely that PAD will be increasingly common in the future. Additionally, symptomatic PAD events have been strongly associated with an increased risk for cardiovascular events [3]. Therefore, proper clinical evaluation and early diagnosis is imperative.

Regarding physical examination, inconsistencies of clinical findings in the diagnosis of PAD are frequent [4]. However, detailed medical history including a systematic review of symptoms (walking impairment, intermittent claudication, ischemic rest pain and/or non-healing wounds) as well as careful clinical examination should be included in the initial management of such patients, especially over 50 years old with atherosclerosis risk factors [5]. According to recent Guidelines, patients at risk for PAD such as the diabetic patients should undergo comprehensive pulse examination and inspection of the feet (Class I; level of evidence C) [5]. Although the most common symptom of PAD is intermittent claudication, non-invasive measures, such as the ankle-brachial index (ABI), show that asymptomatic PAD is several times more common in the population than intermittent claudication is [1].

Therefore, measurement of ABI in both extremities has been recommended in order to verify the presence of PAD and assess additional cardiovascular risk in patients with cardiovascular risk factors or symptoms [5]. However, there is still the question which asymptomatic individuals should ABI be applied to. Combination of American College of Cardiology and American Diabetes Association guidelines indicate: 1) to the <50 years old diabetic patient with additional risk factors, 2) to the >50 years old diabetic patient and 3) to the >70 years old individual even without risk factors. A recent meta-analysis has shown that ABI in combination with Framingham risk score may improve the accuracy of cardiovascular risk prediction [6]. Specifically in patients with known DM, those with low (<0.9) and high (>1.4) ABIs are both at higher risk for cardiovascular complications [7,8]. Additionally, very high (>1.4) as well as very low (<0.4) ABI has been associated with increased mortality [9]. Although increased arterial calcification and stiffness may limit the predictive value of ABI in diabetic patients leading to a large number of falsely high measurements, data indicate that other tools such as the toe-brachial index could overcome such limitations in patients with increased ABI (>1.4) [5,10]. Finally, in patients with normal resting index and symptoms of intermittent claudication, ABI should be measured after exercise as well [5].

Regarding the prognostic value of ABI in asymptomatic patients, abnormal ABI values have been associated with increased risk for future adverse cardiac events in patients with known coronary artery disease [11]. A recent study of almost 4,300 patients has identified ABI as a potent predictor of stroke in general population as well [12]. Furthermore, there is recent evidence that patients with values<0.9 or >1.4 are almost four times more likely to have a silent cerebral small vessel disease [13]. Low ABI has been also associated with carotid atherosclerosis [14], and therefore, several authors have underlined a promising role of this measurement in screening for carotid and intracranial atherosclerosis as well [15].

Finally, ABI could be utilized as a predictor of outcomes even in patients who have undergone acute cardiovascular events or surgery. Flu et al have shown that asymptomatic low ABI has a prognostic value to predict perioperative myocardial damage in vascular surgery patients [16]. However, data on predicting late postoperative events are still scarce. In patients with non-cardio-embolic stroke, low ABI values have been shown to independently predict early 30-day recurrent strokes [17] as well as vascular events and functional outcome after 1 year of follow-up [18]. Therefore, this index could be incorporated in future preventive strategies although more studies should evaluate its predictive role in the late setting.

In conclusion, ABI is a very useful diagnostic and prognostic measurement that could be easily performed in daily clinical practice. When applied broadly, this tool could help reducing overall cardiovascular morbidity and mortality, especially in patients of higher risk.

References

1. Criqui MH, Aboyans V (2015) Epidemiology of peripheral artery disease. Circulation Research 116: 1509-1526.
2. Chen Q, Shi Y, Wang Y, Li X (2015) Patterns of disease distribution of lower extremity peripheral arterial disease. Angiology 66: 211-218.
3. Grenon SM, Vittinghoff E, Owens CD, Conte MS, Whooley M, et al. (2013) Peripheral artery disease and risk of cardiovascular events in patients with coronary artery disease: insights from the Heart and Soul Study. Vasc Med 18: 176-184.
4. Jude EB, Eleftheriadou I, Tentolouris N (2010) Peripheral arterial disease in diabetes--a review. Diabet Med 27: 4-14.
5. Rooke TW, Hirsch AT, Misra S, Sidawy AN, Beckman JA, et al.; American College of Cardiology Foundation Task Force; American Heart Association Task Force (2013) Management of patients with peripheral artery disease (compilation of 2005 and 2011 ACCF/AHA Guideline Recommendations): a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation 127: 1425-1443.
6. Ankle Brachial Index Collaboration, Fowkes FG, Murray GD, Butcher I, Heald CL, Lee RJ, et al. (2008) Ankle brachial index combined with

Framingham Risk Score to predict cardiovascular events and mortality: a meta-analysis. JAMA 300: 197-208.

7. Hyun S, Forbang NI, Allison MA, Denenberg JO, Criqui MH, et al. (2014) Ankle-brachial index, toe-brachial index, and cardiovascular mortality in persons with and without diabetes mellitus. J Vasc Surg 60: 390-395.
8. Potier L, Roussel R, Labreuche J, Marre M, Cacoub P, et al; REACH Investigators. (2015) Interaction between diabetes and a high ankle-brachial index on mortality risk. Eur J Prev Cardiol 22: 615-621.
9. Wang Y, Mou Q, Zhao D, Xu Y, Hu D, et al. (2012) Predictive value of ankle-brachial index and blood glucose on the outcomes of six-year all-cause mortality and cardiovascular mortality in a Chinese population of type 2 diabetes patients. Int Angiol 31: 586-594.
10. Stoekenbroek RM, Ubbink DT, Reekers JA, Koelemay MJ (2015) Hide and seek: does the toe-brachial index allow for earlier recognition of peripheral arterial disease in diabetic patients? Eur J Vasc Endovasc Surg 49: 192-198.
11. Lee JY, Lee SW, Lee WS, Han S, Park YK, et al. (2013) Prevalence and clinical implications of newly revealed, asymptomatic abnormal ankle-brachial index in patients with significant coronary artery disease. JACC Cardiovasc Interv 6: 1303-1313.
12. Gronewold J, Hermann DM, Lehmann N, Kröger K, Lauterbach K, et al; Heinz Nixdorf Recall Study Investigative Group (2014) Ankle-brachial index predicts stroke in the general population in addition to classical risk factors. Atherosclerosis 233: 545-550.
13. Del Brutto OH, Sedler MJ, Mera RM, Lama J, Gruen JA, et al. (2015) The association of ankle-brachial index with silent cerebral small vessel disease: results of the Atahualpa Project. Int J Stroke 10: 589-593.
14. Brasileiro AC, Oliveira DC, Victor EG, Oliveira DA, Batista LL (2013) Association between ankle-brachial index and carotid atherosclerotic disease. Arq Bras Cardiol 100: 422-428.
15. Jiménez M, Dorado L, Hernández-Pérez M, Alzamora MT, Pera G, et al. (2014) Ankle-brachial index in screening for asymptomatic carotid and intracranial atherosclerosis. Atherosclerosis 233: 72-75.
16. Flu WJ, van Kuijk JP, Voûte MT, Kuiper R, Verhagen HJ, et al. (2010) Asymptomatic low ankle-brachial index in vascular surgery patients: a predictor of perioperative myocardial damage. Eur J Vasc Endovasc Surg 39: 62-69.
17. Tsivgoulis G, Bogiatzi C, Heliopoulos I, Vadikolias K, Boutati E, et al. (2012) Low ankle-brachial index predicts early risk of recurrent stroke in patients with acute cerebral ischemia. Atherosclerosis 220: 407-412.
18. Alvarez-Sabín J, Quintana M, Santamarina E, Maisterra O, Gil-Núñez A (2014) Low ankle-brachial index predicts new vascular events and functional outcome after 1 year in patients with non-cardioembolic stroke: our experience and review. Eur J Neurol 21: 100-106.