

# The validity of Ankle- brachial Index in Free Fibular Flap Surgery for Facial Reconstruction.

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## Abstract

Ankle brachial index test is used as a guide in maxillofacial surgery to detect any abnormalities associated with circulation in the lower extremities. This index is about 1 or 1.1 in normal conditions, if it is decreased or increased this mean that there are some abnormalities in haemodynamic such as peripheral arterial diseases. A study carried out in Al-Hilla surgical hospital including 20 patients for estimation of ankle-brachial index(volunteers) to show their fitness for free flap surgery. The results were normal in 13 patients, most of them in young adult groups.

**Keywords;** Ankle-brachial, fibular, free,flap,cardiovascular,Vascularized

## الخلاصة

يستخدم مؤشر الكاحل كدليل في الجراحة للكشف عن الشذوذ المرتبطة بتداول الدم في القسم السفلي للجسم. الرقم القياسي حوالي 1 أو 1.1 في الظروف الطبيعية، وإذا كان هنالك انخفاض أو زيادة في النسبة فهذا يعني أن هناك بعض حالات الشذوذ في دوران الدم في الأطراف وهذا ما يحدث في أمراض الشرايين الطرفية. أجريت هذه الدراسة في مستشفى الحلة الجراحي متضمنة 20 مريضاً لقياس مؤشر الكاحل (متطوعين) وذلك لمعرفة مدى استعدادهم لعمليات اخذ أنسجة من منطقة الكاحل لتعويض فقدان أنسجة الوجه والفكين. وكانت النتائج طبيعية في 13 مريضاً أغلبهم من الأعمار المبكرة.

**الكلمات المفتاحية:** مؤشر الكاحل، مساعدة الساق، حر، صفة، وعائي.

## Introduction

Ankle-brachial index is a primary measures used before undergoing free flap surgery for reconstruction of facial bones especially in tumors of the jaws .it is estimated by dividing the blood pressure (systolic) in the ankle area by the pressure in the upper arms ,it is approximating 1 or 1.1.It is preferable to use the higher of two systolic pressures in arms and feet. If it is more than 0.9 it is consider to be within normal limits. We use fibular flap in reconstruction of the jaws especially the mandibular area after tumor removal due to more stability of this bone than the other bones in the body. We can also use implant in the fibular bone before complete transferring to the recipient site.

## Literature review

The ankle-brachial index (ABI) has been shown to be a marker of cardiovascular risk. Review of the literature shows that the ABI does indeed have a high specificity for predicting cardiovascular events.(Anand & Sonia, 2005) This simple non invasive test should be incorporated into cardiovascular risk assessment of certain patient populations. New flaps were designed for reconstruction of the head and neck based on the ability to transfer distant tissues and provide immediate viability through a vascular anastomosis.(McDermott *et al.*, 2002)

In 1975 Taylor and colleagues described the free fibula flap, while Hidalgo(Hidalgo, 1989; Taylor, 1982)) applied the technique for mandibular reconstruction in 1989. The ABI may help to identify asymptomatic individuals in the general population who are at increased risk of subsequent cardiovascular events. Evaluation is now required of the potential of incorporating ABI measurement into cardiovascular prevention programmes.(Weatherley *et al.*, 2007)

### Materials and methods

Twenty patients were examined as volunteers for ankle-brachial index estimation. Sphygmomanometer was used to measure the blood pressure (systolic) in both upper arms and in the feet .We divide the systolic blood pressures in the feet by the higher of pressures in the upper arms, the result should be equal to 1 or 1.1. Measurements are usually repeated at both sites after 5 minutes of walking on a treadmill. Doppler system is used in few of the patients mentioned above as a mean of clinical comparison.

### Results

Table 1-1 shows the distribution of the patients according to the age group,4 patients (50-60 yr) had ischaemic heart disease,13 patients were coming with no any apparent diseases 10 of them in the age group of (20-30 yr),and 3 in the age group of (10-20 yr),2 patients in the age group of (40-50 yr) were coming with diabetes.Only (1) patient was coming with Burger disease with (55 yr ) old.

**Table 1-1 ; distribution of the patients according to the age group**

patients	Age group(yr)	Medical problem	Index
4	50-60	IHD	0.7-0.8
1	55	Burger disease	0.5
10	20-30	No problem	1-1.1
2	40-50	Diabetic	1
3	10-20	No problem	1-1.1

**Table 1-2; Means of examinations .Note;The patient with Burger disease examined by primary method**

Age group	ABI (no. of patients)	Doppler(no. of patients)
50-60	4	
20-30	10	
10-20	3	2
40-50	2	2

## Discussion

Ankle –brachial index is considered as one of the primary and a little bit important means in assessment of patients who undergo free fibular flap surgery in reconstruction of facial bony defects (Hidalgo, 1989). Free flaps became popular in the head and neck region due to the ability to transfer Vascularized bone and soft tissue in one stage at the time of the resection, with predictable high success rates (Serletti *et al.*, 1998). It is also obvious that they increased the choices of tissue availability, as well as pliability, texture, color, etc, in the quest to achieve an ideal reconstruction and a functional rehabilitation of the patient.(Anand & Sonia, 2005))

Of the total number of volunteers who examined for ankle-brachial index value 65% were considered to be fit for such procedure and all of them in the young adult age group, this percentage goes with finding of Smith and colleague (2003) . (Smith *et al.*, 2003) .Some of the patients in the age group of 40-50 yrs who were diabetic showed false positive reading due to calcification in blood vessels, so those patients should be considered as unfit for surgical procedures. Ischaemic heart diseases are the major problems in patients undergo free flap surgical procedures, these diseases affect the old ages predominantly although the tumors occur in high percentage in these ages so the reconstruction will be problematic. Only 1 patient had (Burger disease) who was seen accidentally in out patient clinic, he had a score of 0.5 (fig 3&4 ) and that was absolutely unfit for surgery. There was no significant difference in estimation of blood pressure between the conventional ankle-brachial index and the doppler system if this was carried out by an expert. The ankle:brachial index (ABI) has traditionally been used to identify peripheral artery disease (PAD) and quantify its severity. An abnormal ABI is reflective of atherothrombotic stenotic or occlusive disease in the major arteries at any level from the aorta to the ankle. Although a normal ABI (> 0.90 – 1.40) does not rule out atherothrombotic disease that is not causing a hemodynamic change, it is very useful in identifying disease (Weatherley *et al.*, 2007) . The specificity of a low ankle-brachial index to predict future cardiovascular outcomes is high, but its sensitivity is low (Anand & Sonia, 2005). The ankle-brachial index should become part of the vascular risk assessment among selected individuals (Heled *et al.*, 2006). Implants can be added to the harvested fibular bone(Frodel *et al.*, 1993).



**Fig 1;Burger disease(thrombo angitis obliterance)**



**Fig 2;Same patient in fig 1**

## Conclusions

Estimation of the ankle-brachial index is considered to be very important prior to free fibular flap harvesting for facial reconstruction .This can be done either conventionally by dividing the systolic pressures in lower arms by the pressure in the upper arms,or can be done by using Doppler system,however,the traditional previous one is adopted as a primary method of examination

## References

- Anand V. Doobay and Sonia S. Anand. Sensitivity and Specificity of the Ankle–Brachial Index to Predict Future Cardiovascular Outcomes: A Systematic Review. *Arterioscler. Thromb. Vasc. Biol.* 2005;25;1463-1469
- BD Weatherley et al; The association of the ankle-brachial index with incident coronary heart disease: the Atherosclerosis Risk In Communities (ARIC) study, 1987–2001 *BMC Cardiovascular Disorders.* 2007, 7:3
- Frodel JL, Funk GF, Capper DT, et al. Osseointegrated implants: a comparative study of bone thickness in four vascularized bone flaps. *Plast Reconstr Surg* 1993;92:449–55
- Healed C, L et al ;Risk of mortality and cardio vascular disease associated with ankle-brachial index; Systematic review 2006 ,vol.189,no 1,pp 61-69
- Helaine E. Resnick, PhD, MPH, et al; Relationship of High and Low Ankle Brachial Index to All-Cause and Cardiovascular Disease Mortality: The Strong Heart Study. *Circulation.* 2004;109:733-739
- Hidalgo DA. Free fibula flap: a new method of mandibular reconstruction. *Plast Reconstr Surg* 1989;84:71–9
- McDermott MM, Greenland P, Liu K, et al. The ankle-brachial index is associated with leg function and physical activity: the Walking and Leg Circulation Study. *Ann Intern Med* 2002;136:873–83.
- Serletti JM, Coniglio JU, Tavin E, Bakamjian VY. Simultaneous transfer of free fibula and radial forearm flaps for complex oromandibular reconstruction. *J Reconstr Microsurg* 1998;14:297–303
- Smith RB, Thomas RD, Funk GF. Fibula free flaps: the role of angiography in patients with abnormal results on preoperative color flow Doppler studies. *Arch Otolaryngol Head Neck Surg* 2003; 129:712–5
- Taylor GI. Reconstruction of the mandible with free composite iliac bone grafts. *Ann Plast Surg* 1982;9:361–76