

Outcome of patients with reduced ankle brachial index undergoing open heart surgery with cardiopulmonary bypass

Matthias Meyborg, Christiane Engelbertz, Florian Lüders, Eva Freisinger, Nasser M. Malyar, Holger Reinecke

Division of Vascular Medicine, Department of Cardiovascular Medicine, University Hospital Münster, Münster, Germany

Background:

In open heart surgery using cardiopulmonary bypass, perfusion of the lower extremities is markedly reduced which may induce critical ischemia in patients with pre-existing peripheral artery disease. Whether these patients have an increased risk for amputation and should better undergo peripheral revascularization prior to surgery remains unclear.

Methods:

From 1 January 2009 to 31 December 2010, 785 consecutive patients undergoing open heart surgery were retrospectively included. In 443 of these patients preoperative ankle-brachial-index (ABI) measurements were available. The cohort was divided into four groups: (I) ABI <0.5, (II) ABI 0.5-0.69, (III) ABI 0.7-0.89 or (IV) ABI ≥0.9. Follow-up data of 413 (93.2%) patients were analysed with regard to mortality and amputations.

Results:

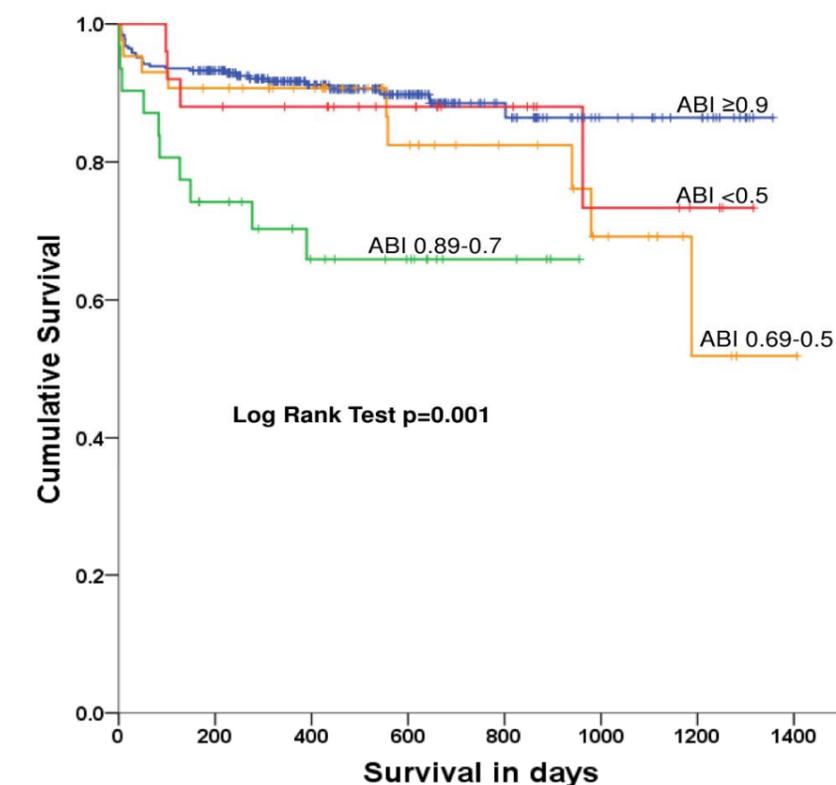
The groups differed significantly in terms of age, cardiac risk factors, performed cardiac surgery, and renal function. Postoperative delayed wound healing was significantly associated with lower ABI (25.9%, 15.2%, 27.0% and 9.6% in group I-IV, respectively, $p=0.003$), whereas 30-day mortality was not significantly higher in patients with lower ABI (0%, 4.3%, 8.1% and 3.9%, respectively, $p=0.4$). Kaplan-Meier models showed a significantly lower long-term survival over four years in patients with reduced ABI ($p=0.001$, long rank test) while amputations occurred rarely with only one minor amputation in group II ($p=0.023$).

Conclusions:

Patients with reduced ABIs undergoing heart surgery showed more wound healing disturbances, and higher long-term mortality compared to those with normal ABIs. However, no perioperative ischemia requiring amputation occurred. Thus, reduced ABIs were not associated with increased peripheral risks in open heart surgery but ABI may be helpful in selecting the site for saphenectomy to potentially avoid delayed healing of related wounds in legs with severely impaired arterial perfusion.

	Complete Cohort	ABI <0.5	ABI 0.5-0.69	ABI 0.7-0.89	ABI ≥0.9	p-value
Patients, n (%)	443 (100)	27 (6.1)	46 (10.4)	37 (8.4)	333 (75.2)	
Gender: men, n (%)	317 (71.6)	19 (70.4)	36 (78.3)	25 (67.6)	237 (71.2)	0.7
Age (years), mean ± SD	67.4 ± 11.1	69.7 ± 8.9	72.2 ± 8.7	67.4 ± 12.1	66.5 ± 11.2	0.007
BMI (kg/m ²), mean ± SD	28.1 ± 4.8	27.1 ± 3.9	27.6 ± 4.4	27.3 ± 4.6	28.3 ± 4.9	0.4
Tobacco use: ever smokers, n (%)	236 (53.3)	19 (70.4)	35 (76.1)	23 (62.2)	159 (47.7)	<0.001
Diabetes mellitus, n (%)	144 (32.7)	15 (57.7)	18 (39.1)	14 (37.8)	97 (29.3)	0.015
Hypertension, n (%)	398 (90.5)	26 (96.3)	42 (93.3)	34 (94.4)	296 (89.2)	0.4
Carotid stenosis, n (%)	57 (12.9)	5 (18.5)	12 (26.1)	12 (32.4)	28 (8.4)	<0.001
Previous myocardial infarction, n (%)	59 (13.3)	6 (22.2)	12 (26.1)	5 (13.5)	36 (10.8)	0.017

Table 1: Baseline Characteristics.



ABI Group	0	200	400	600	800	1000	1200	1400
ABI ≥0.9	310	271	173	95	42	20	13	0
ABI 0.89-0.7	31	21	14	10	4	0	0	0
ABI 0.69-0.5	43	38	32	20	14	9	3	1
ABI <0.5	25	22	20	15	10	5	3	0

Fig.1: Projected long-term survival from a Kaplan Meier Model according to ABI of patients.