

Table 1. Distribution of patients' demographics, medical history and lesion characteristics in Euro-CTO cohort and their association with the failure of PCI estimated with univariate logistic regression analyses.

	Overall	Success	Failure	Univariate analyses	
	Total	Total N = 12526	Total N = 2356		
	N = 14882	(84.2 %)	(15.8 %)	OR (95 % CI)	P ^a
	Total N	N (%)	N (%)		
CABG^b					
No	12489	10678 (85.5)	1811 (14.5)	1.00	
Yes	1942	1516 (78.1)	426 (21.9)	1.66 (1.47 – 1.87)	<0.001
Missing	451	332 (73.6)	119 (26.4)	-	
Age (years)					
<55	3128	2723 (87.1)	405 (12.9)	1.00	<0.001
55-	2269	1925 (84.8)	344 (15.2)	1.20 (1.03 – 1.40)	
60-	2517	2118 (84.1)	399 (15.9)	1.27 (1.09 – 1.47)	
65-	2307	1937 (84.0)	370 (16.0)	1.28 (1.10 – 1.50)	
70-	2262	1860 (82.2)	402 (17.8)	1.45 (1.25 – 1.69)	
75-	1468	1201 (81.8)	267 (18.2)	1.49 (1.26 – 1.77)	
80-	907	744 (82.0)	163 (18.0)	1.47 (1.21 – 1.80)	
Missing	24	18 (75.0)	6 (25.0)	-	
Tortuosity					
Straight/slight	9411	8224 (87.4)	1187 (12.6)	1.00	<0.001
Moderate	3355	2810 (83.8)	545 (16.2)	1.34 (1.20 – 1.50)	
Severe/unseen	1639	1160 (70.8)	479 (29.2)	2.86 (2.53 – 3.23)	
Missing	477	332 (69.6)	145 (30.4)	-	
Calcification					
No/mild	8327	7330 (88.0)	997 (12.0)	1.00	<0.001
Moderate	4062	3425 (84.3)	637 (15.7)	1.37 (1.23 – 1.52)	
Severe	1973	1394 (70.7)	579 (29.3)	3.05 (2.72 – 3.43)	
Missing	520	377 (72.5)	143 (27.5)	-	
Stump					
No	1796	1331 (74.1)	465 (25.9)	1.00	
Blunt	5809	4772 (82.1)	1037 (17.9)	2.00 (1.79 – 2.22)	<0.001
Tapered	6315	5695 (90.2)	620 (9.8)	3.21 (2.81 – 3.67)	<0.001
Missing	962	728 (75.7)	234 (24.3)	-	
Length of CTO^c (mm)					
<20	3740	3363 (89.9)	377 (10.1)	1.00	<0.001
20-	2581	2232 (86.5)	349 (13.5)	1.40 (1.19 – 1.63)	
25-	1580	1358 (85.9)	222 (14.1)	1.46 (1.22 – 1.74)	
30-	2034	1701 (83.6)	333 (16.4)	1.75 (1.49 – 2.05)	
35-	4053	3300 (81.4)	753 (18.6)	2.04 (1.78 – 2.32)	
Missing	894	572 (64.0)	322 (36.0)	-	

^aP values for the binary variable corresponds to the Wald-test, otherwise to the trend test across groups. OR – Odds ratio, CI – confidence intervals, ^bCABG – previous coronary artery bypass graft, ^cCTO – coronary total occlusion.

Table 2. Multivariable logistic regression analysis for failure of PCI by EuroCTO CASTLE model and the assignment of risk scores to the risk factors on the imputed derivation set.

EuroCTO CASTLE model				
Risk factors	OR (95 % CI)	P-value	Log(OR)	Robust scoring
CABG				
No	1.00		0	0
Yes	1.42 (1.25 - 1.61)	<0.0001 ^a	0.35	1
Age (years)				
<55	1.00	<0.001	0	0
55-	1.18 (1.01 - 1.38)		0.17	0
60-	1.18 (1.01 - 1.37)		0.16	0
65-	1.15 (0.98 - 1.35)		0.14	0
70-	1.28 (1.09 - 1.49)		0.24	1
75-	1.29 (1.08 - 1.54)		0.25	1
80-	1.34 (1.09 - 1.66)		0.30	1
Tortuosity				
Straight/Slight	1.00	<0.001	0	0
Moderate	1.15 (1.02 - 1.28)		0.14	0
Severe/Unseen	2.28 (2.00 - 2.60)		0.82	1
Calcification				
No/mild	1.00	<0.001	0	0
Moderate	1.15 (1.03 - 1.28)		0.14	0
Severe	2.18 (1.92 - 2.47)		0.78	1
Stump				
Tapered	1.00	<0.001	0	0
Blunt	1.64 (1.47 - 1.84)		0.50	1
No	2.74 (2.39 - 3.14)		1.01	1
Length of CTO (mm)				
<20	1.00	<0.001	0	0
20-	1.43 (1.23 - 1.67)		0.36	1
25-	1.49 (1.24 - 1.79)		0.40	1
30-	1.60 (1.36 - 1.89)		0.47	1
35-	1.78 (1.55 - 2.04)		0.58	1

Multiple imputation = 20, number of observation = 14882, due to nonresponse the average relative variance increase, RVI = 0.048, the largest fraction of missing information, FMI = 0.124. P-value corresponding to the ^aWald-test otherwise to the trend test across groups.

Table 3. Observed and predicted risks on the derivation dataset.

Risk scores	Number of procedures	Number of failures	Mean predicted risk (%)
0	1129	68	5.8
1	3959	347	9.3
2	5530	797	14.5
3	2936	671	22.1
4	1056	345	32.3
5	238	110	44.7
6	34	18	56.5
Total	14882	2356	15.8