Definite and probable bioresorbable scaffold thrombosis in stable and ACS patients

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We read with great interest the recent report by Capodanno et al[1]. In the European multicentre GHOST-EU registry, the authors reported that the rate of definite/probable scaffold thrombosis was 2.1% (definite scaffold thrombosis: 1.8%, probable scaffold thrombosis: 0.3%) in an all-comers population at six months. More specifically, the rate of definite/probable scaffold thrombosis was 1.4% (9/626) in stable/silent angina pectoris (SAP), 2.5% (14/563) in acute coronary syndrome (ACS) and 2.1% (4/192) in ST-segment elevation myocardial infarction (STEMI). This publication prompted us to review the rates of scaffold thrombosis in all-comers, SAP, ACS and STEMI either reported so far in peer review journals or presented at international meetings.

Table 1 summarises the rate of scaffold thrombosis in each individual report. Excluding the GHOST-EU registry, the rate of definite/probable scaffold thrombosis was 0.89% in all-comers, 0.68% in SAP, 1.71% in ACS and 0.67% in STEMI. There were 25 definite and two probable scaffold thromboses. Out of 27 patients with scaffold thrombosis, two had acute (≤24 hours

Table 1. The rate of ST in individual populations*.

Study (journal/ international congress)	Population	Follow-up	Total, N	Acute ST in total, N (%)	Subacute ST in total, N (%)	Early ST in total, N (%)	ST in total, N (%)	SAP, N	ST in SAP, N (%)	ACS, N	ST in ACS, N (%)	STEMI, N	ST in STEMI, N (%)
Kraak et al, AMC single-centre (EIJ 2014)	All-comers	6 mo	135	0 (0%)	3 (2.2%)	3 (2.2%)	4 (3.0%)	82	1 (1.2%)	53	3 (5.7%)	17	0 (0%)
ABSORB FIRST, (EuroPCR 2014)	All-comers	1 mo	800	0 (0%)	2 (0.3%)	2 (0.3%)	2 (0.3%)	295	N/A	505	N/A	N/A	N/A
Azzalini et al, (EuroPCR 2014)	All-comers	N/A	339	0 (0%)	4 (1.2%)	4 (1.2%)	4 (1.2%)	N/A	3 (N/A)	N/A	0 (N/A)	N/A	1 (N/A)
Abizaid et al, ABSORB EXTEND (EIJ 2014)	SAP	12 mo	512	0 (0%)	2 (0.4%)	2 (0.4%)	4 (0.8%)	512	4 (0.8%)	–	–	–	–
Serruys et al, ABSORB B (EIJ 2014)	SAP	36 mo	101	0 (0%)	0 (0%)	0 (0%)	0 (0%)	101	0 (0%)	–	–	–	–
Onuma et al, ABSORB A (JACC CI 2013)	SAP	60 mo	30	0 (0%)	0 (0%)	0 (0%)	0 (0%)	30	0 (0%)	–	–	–	–
CORONARY CTO (EuroPCR 2014)	SAP	6 mo	35	0 (0%)	0 (0%)	0 (0%)	0 (0%)	35	0 (0%)	–	–	–	–
Serruys et al, ABSORB II (Lancet 2014)	SAP/UAP	12 mo	335	1 (0.3%)	1 (0.3%)	2 (0.6%)	3 (0.9%)	267	3 (1.1%)	68	0 (0%)	–	–
ASSURE registry (EuroPCR 2014)	SAP/UAP	12 mo	183	0 (0%)	0 (0%)	0 (0%)	0 (0%)	144	0 (0%)	39	0 (0%)	–	–
BVS EXPAND (EuroPCR 2014)	SAP/UAP	6 mo	200	0 (0%)	0 (0%)	0 (0%)	4 (2.2%)	N/A	N/A	N/A	N/A	–	–
Gori et al (EIJ 2014)	ACS	1 mo	150	1 (0.7%)	1 (0.7%)	2 (1.4%)	4 (2.7%)	–	–	150	4 (2.7%)	66	N/A
POLAR ACS (EuroPCR 2014)	ACS	12 mo	100	0 (0%)	0 (0%)	0 (0%)	0 (0%)	–	–	100	0 (0%)	16	0 (0%)
Kajiya et al (EIJ 2013)	STEMI	3 mo	11	0 (0%)	0 (0%)	0 (0%)	0 (0%)	–	–	–	–	11	0 (0%)
Diletti et al, BVS STEMI (EHJ 2014)	STEMI	1 mo	49	0 (0%)	0 (0%)	0 (0%)	0 (0%)	–	–	–	–	49	0 (0%)
Kocka et al, PRAGUE-19 (EHJ 2014)	STEMI	4 mo	41	0 (0%)	1 (2.4%)	1 (2.4%)	1 (2.4%)	–	–	–	–	41	1 (2.4%)
Wiebe et al (CRC 2014)	STEMI	6 mo	25	0 (0%)	0 (0%)	0 (0%)	0 (0%)	–	–	–	–	25	0 (0%)
Ielasi et al, RAI registry (EIJ in press)	STEMI	6 mo	74	0 (0%)	1 (1.4%)	1 (1.4%)	1 (1.4%)	–	–	–	–	74	1 (1.4%)
Weighted average excluding the GHOST-EU registry	Average F/U: 10.6 months		3,120	0.06%	0.48%	0.54%	0.89%	1,171	0.68%	410	1.71%	299	0.67%
Capodanno et al, GHOST (EIJ 2014)	All-comers	6 mo	1,189	5 (0.4%)	11 (0.9%)	16 (1.3%)	23 (2.1%)	626	9 (1.4%)	563	14 (2.5%)	192	4 (2.1%)
Weighted average including the GHOST-EU registry	Average F/U: 10.3 months		4,309	0.16%	0.60%	0.76%	1.22%	1,797	0.94%	973	2.16%	491	1.22%

*ACS: acute coronary syndrome; SAP: stable/silent angina pectoris; ST: scaffold thrombosis; STEMI: ST-segment elevation myocardial infarction. CRC: Clinical Research in Cardiology; EHJ: European Heart Journal; EIJ: EuroIntervention; JACC CI: JACC Cardiovascular Interventions

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after procedure) thrombosis (0.06%) and 15 had subacute after one day (≤1 month after procedure) thrombosis (0.48%). Premature discontinuation of dual antiplatelet therapy (DAPT) or resistance to clopidogrel at the time of scaffold thrombosis was documented in 29.4% patients (5/17). The rate of scaffold thrombosis when the GHOST-EU registry is added to the series is tabulated at the bottom of **Table 1**. Potential aetiological causes of scaffold thrombosis could be: 1) suboptimal implantation resulting in underexpansion/acute incomplete strut apposition[2-4] or acute disruption of struts[5]; 2) platelet activation due to low shear stress created by the relatively thick strut[6]; 3) delayed tissue coverage in an overlapped segment[7-9]; 4) discontinuation of DAPT or resistance to DAPT[9].

In the first randomised comparison of ABSORB II[10], the rate of definite scaffold/stent thrombosis was 0.6% in Absorb (one acute and one subacute case) and 0% in XIENCE (p=1.0), and the rate of definite/probable scaffold/stent thrombosis was 0.9% in Absorb and 0% in XIENCE (p=0.55)[10].

Further randomised studies may or may not confirm these scaffold thrombosis rates in the future[11,12].

Conflict of interest statement

The authors have no conflicts of interest to declare.

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