

Retrograde Approach Relevant Complications

Sub-Analysis from 5 Years Japanese Multicenter
CTO Registry Data

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On behalf of Retrograde Summit Investigators

Background

Procedure success of PCI for chronic total occlusion (CTO) has improved, however, occurrence of complications related to retrograde approach are still reported.

Aim

The aim of this sub-analysis is to evaluate association between procedure success and Retrograde approach relevant complications.

Method

Total of 2,194 data that collected by Retrograde Summit registry between January 2009 and December 2013 from 56 centers in Japan were analyzed.

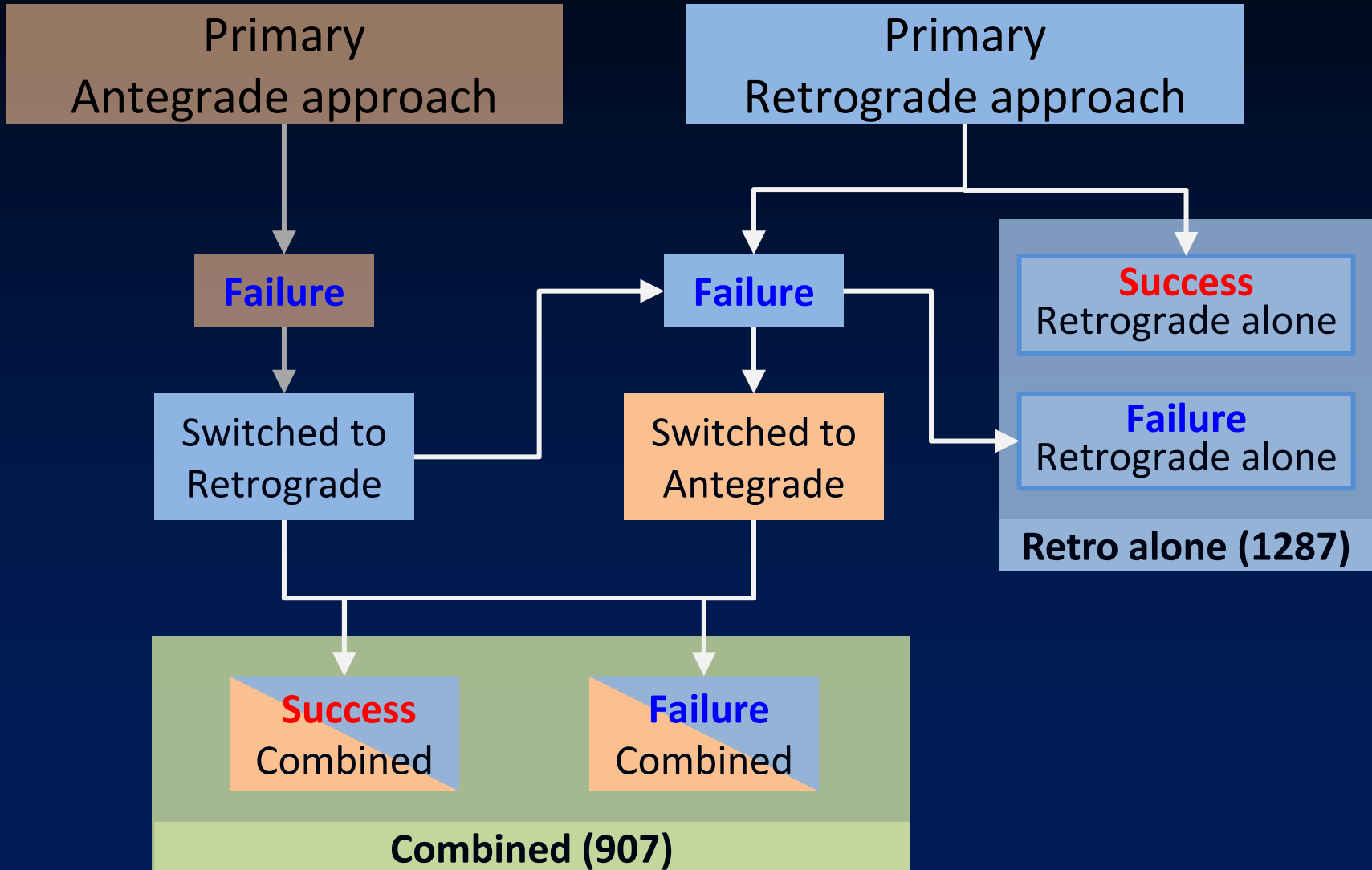
Definitions

- Retrograde Approach
 - Any CTO-PCI attempt, with wiring through collateral channels
- Procedural Success
 - Recanalization of target lesion with restoration of TIMI flow grade 3 and residual stenosis <50%
- Clinical Success
 - Procedural success with no MACCE event

Definitions

- MACCE (Major Adverse Cardiac and Cerebrovascular Event)
 - Death, Myocardial Infarction, Stroke, Emergent CABG and/or TVR
- Higher volume center (HC)
 - There is one or more operator with estimated CTO-PCI volume > 50 per year* (* including proctor cases)
- Lower volume center (LC)
 - There is not such higher volume operator

Flowchart



Registry Data

2,194 cases

Switch to Retrograde after failed
Antegrade Approach:

Combined Group (907)

Retrograde Approach
Alone:

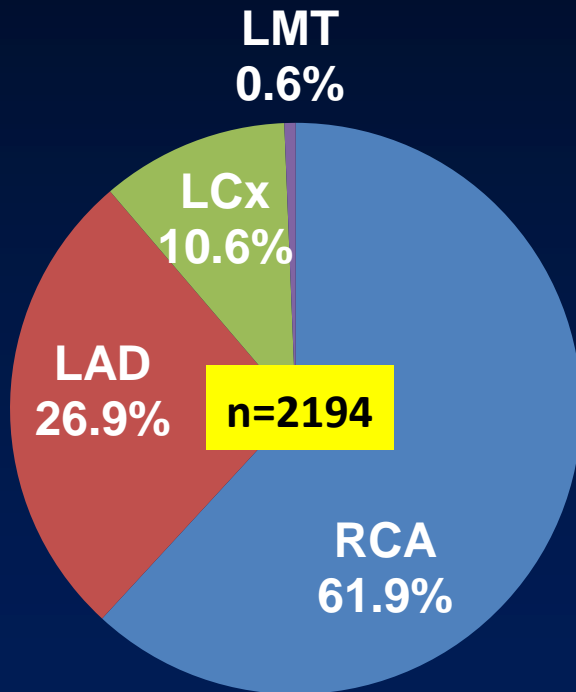
Retro alone Group (1287)

General Information

Patient Characteristics	N=2194
Male	87.7% (1921)
Age (years)	66.4±10.6
Previous MI	46.0% (1009)
Previous CABG	15.5% (318)
Multi Vessel Disease	62.3% (1366)
Hypertension	73.9% (1622)
Diabetes Mellitus	43.9% (963)
Hyperlipidemia	67.7% (1486)
Smoking	42.6% (934)

Lesion Characteristics

Target Vessel



Lesion Characteristics

(n=2194)

Calcification	63.4% (1391)
Proximal Tortuosity	31.2% (684)
Bending ≥ 45	29.4% (646)
Occlusion Length ≥ 20 mm	71.9% (1578)
Reference Diameter < 3.0 mm	29.1% (638)
Occlusion Period ≥ 1 year	26.6% (585)
In-stent Occlusion	8.4% (184)
Re-attempt cases	23.9% (522)

Procedure Outcome

Success Rate

Overall (n=2194)

Procedure Success 83.01 (1823)

Clinical Success 82.26 (1805)

Retrograde Group (n=1287)

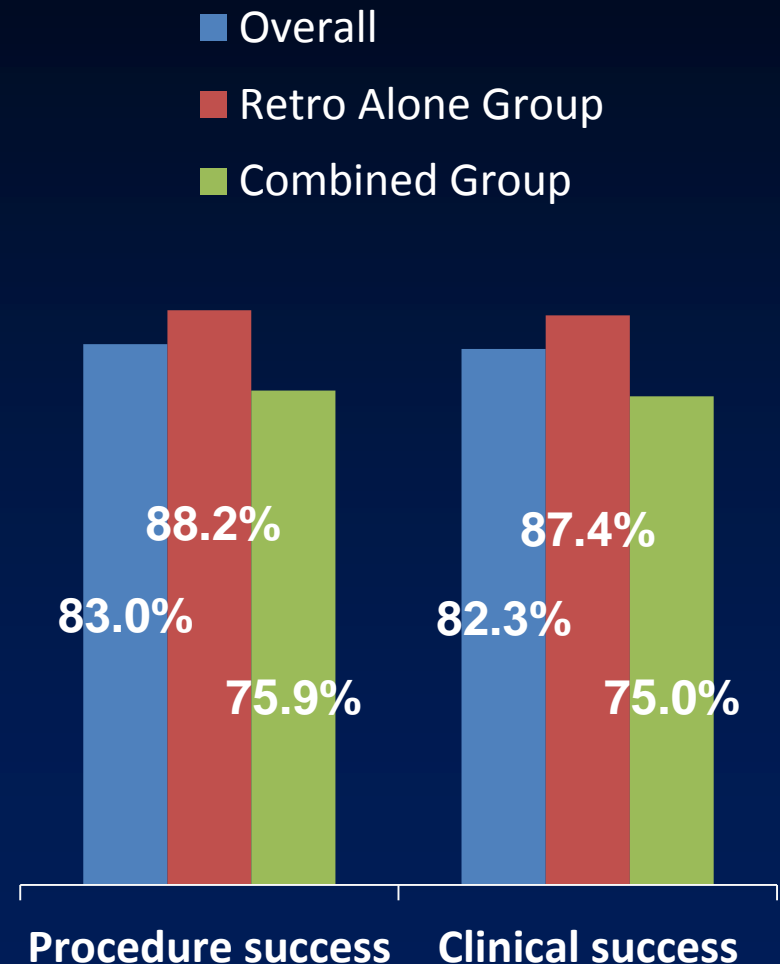
Procedure Success 88.19 (1135)

Clinical Success 87.41 (1125)

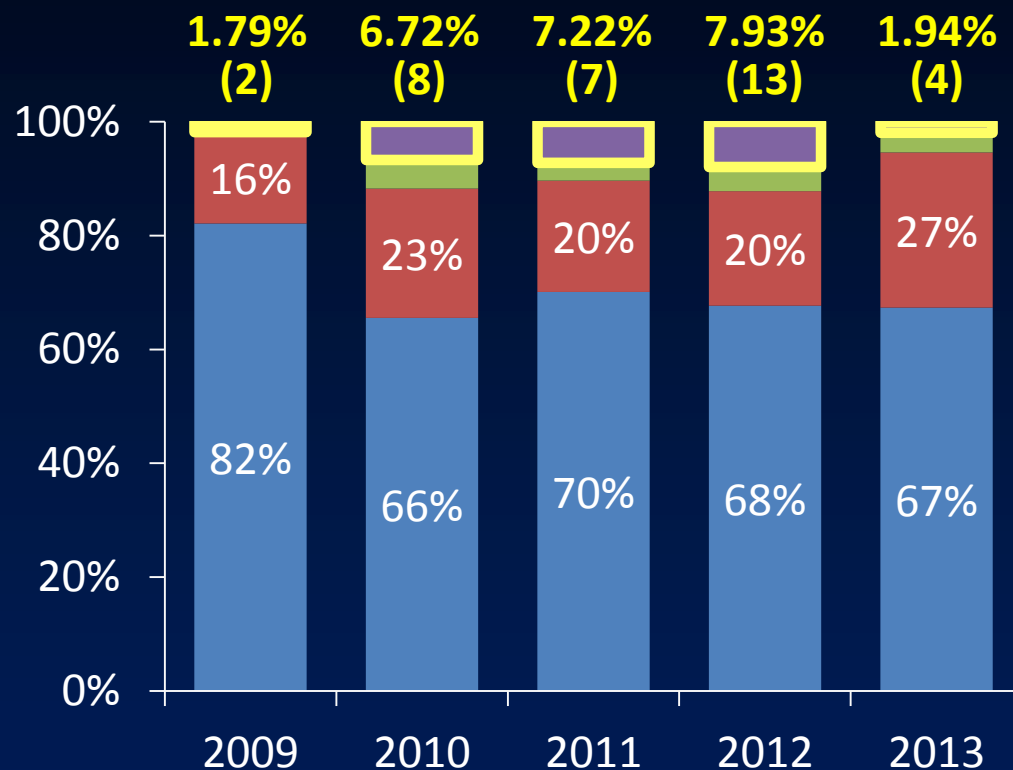
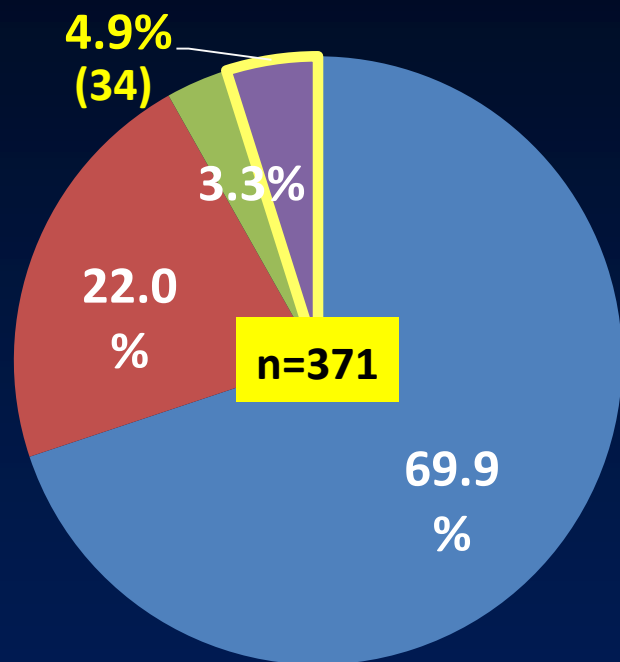
Combined Group (n=907)

Procedure Success 75.85 (688)

Clinical Success 74.97 (680)



Reason of Failure (Overall)



- Could not cross collateral channel
- Could not cross CTO body by GW
- Could not cross CTO body by catheter
- Procedure discontinuation due to complication

Reason of Procedure discontinuation

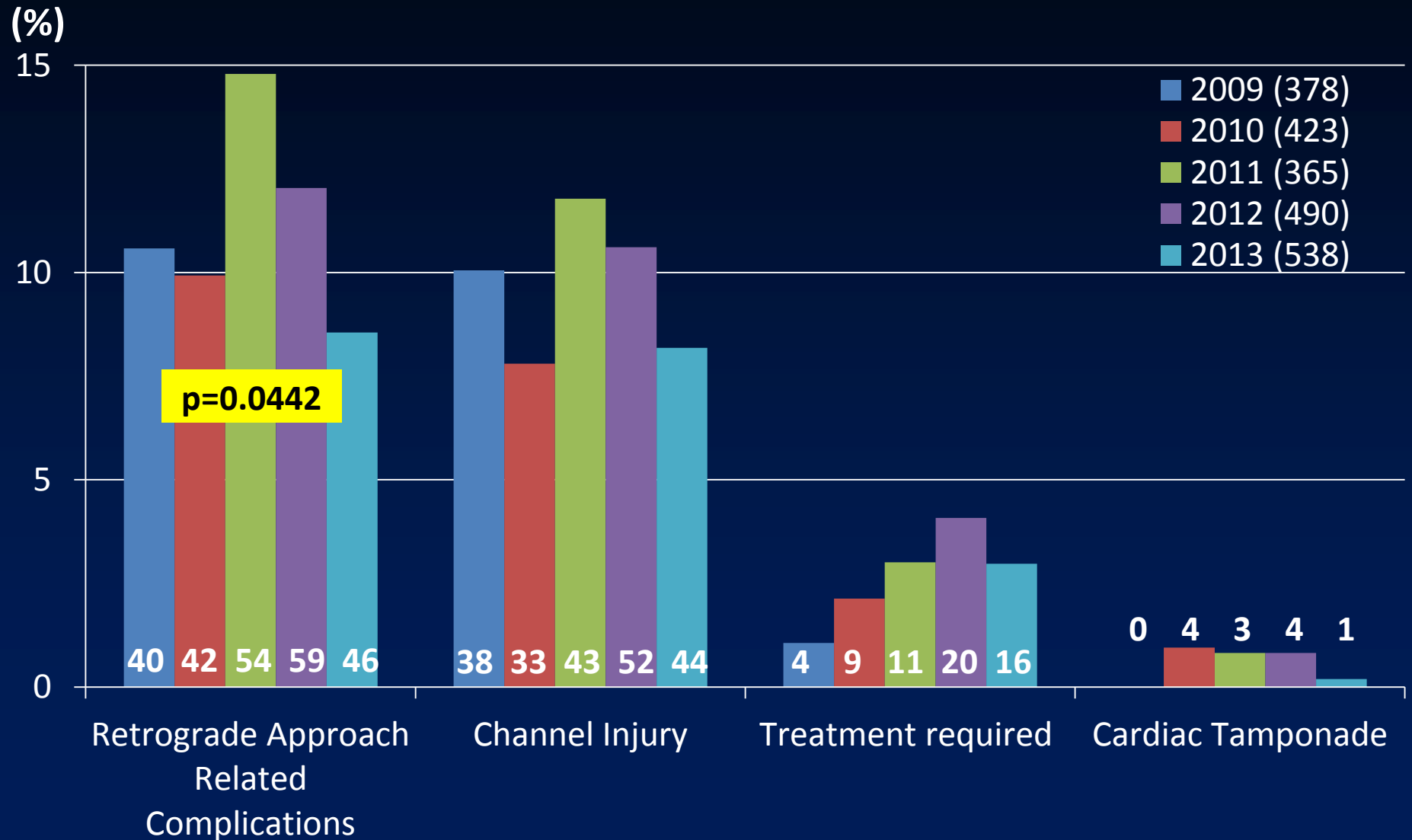
	N=34
BP drop	0.88% (3)
St Elevation	0.59% (2)
Dissection	0.59% (2)
Channel Perforation	0.59% (2)
Cardiac Tamponade	0.29% (1)
Ischemia	0.29% (1)
Hematoma	0.29% (1)
Emergent CABG	0.29% (1)
Donor artery	0.29% (1)
Distal emboli	0.29% (1)
Channel Dissection	0.29% (1)
Unknown	5.29% (18)

Predictors for Procedure Failure



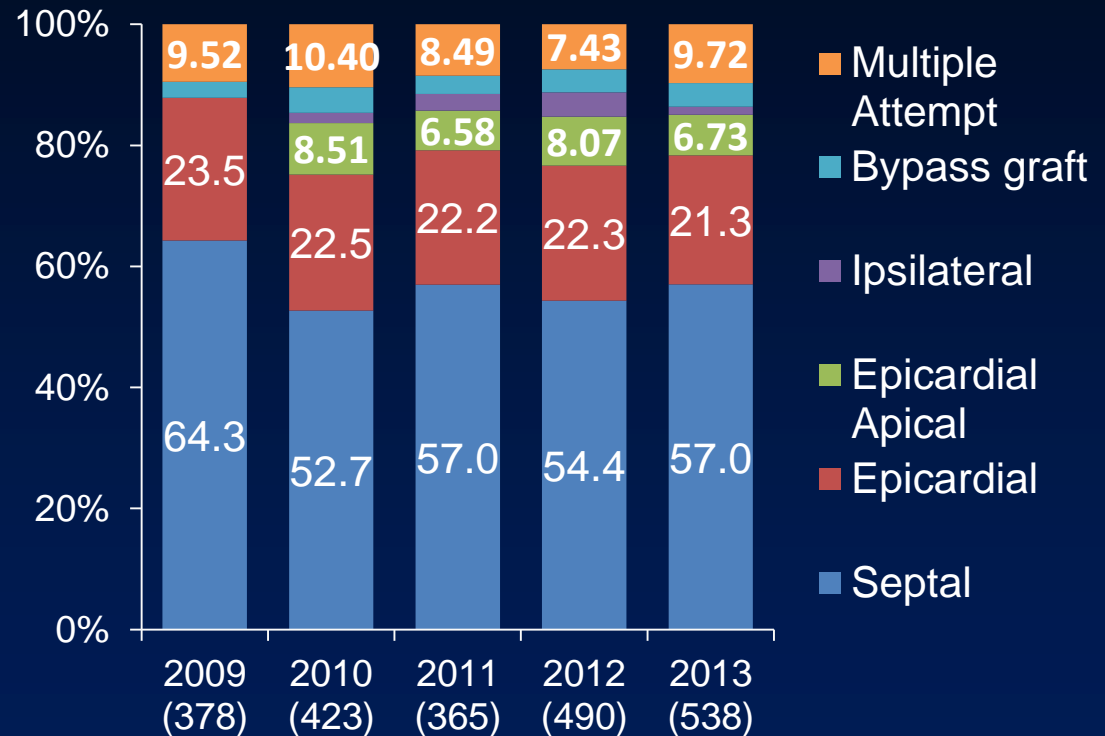
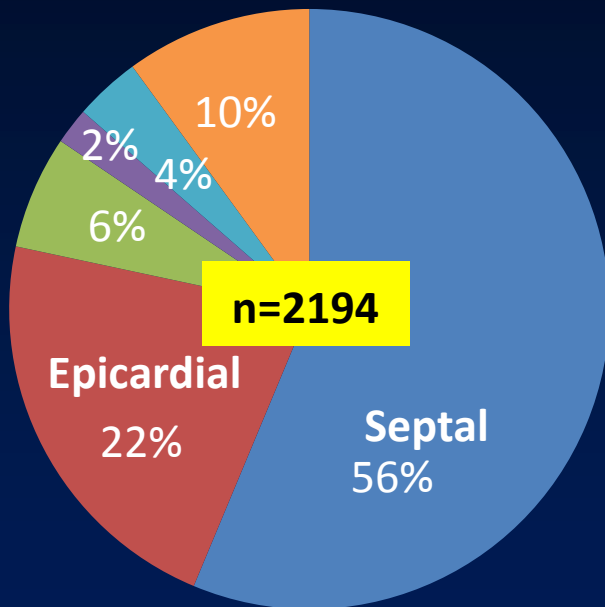
	Univariate			Multivariate		
	Odds	95% CI	P	Odds	95% CI	P
Age 71-80	1.3408	1.0587-1.6980	0.0147			
Previous CABG	1.4443	1.0767-1.9373	0.0138	1.4062	1.0060-1.9499	0.0461
Calcification	1.6477	1.2875-2.1086	<.0001	1.7241	1.3319-2.2394	<.0001
Bending >45	1.6930	1.3418-2.1362	<.0001			
Occlusion Length >20mm	0.7254	0.5713-0.9212	0.0083			
CTO Proximal Tortuosity	1.4451	1.1454-1.8232	0.0018			
Usage of Corsair	0.2100	0.1659-0.2659	<.0001	0.2617	0.2029-0.3363	<.0001
Usage of IVUS	0.1217	0.0860-0.1724	<.0001	0.1685	0.1159-0.2387	<.0001
Treatm. required channel injury	2.2889	1.3155-3.9824	0.0026	2.2769	1.1975-4.2162	0.0128
LC	1.5066	1.2042-1.8850	0.0003	1.3543	1.0537-1.7422	0.0179

Retro Related Complications



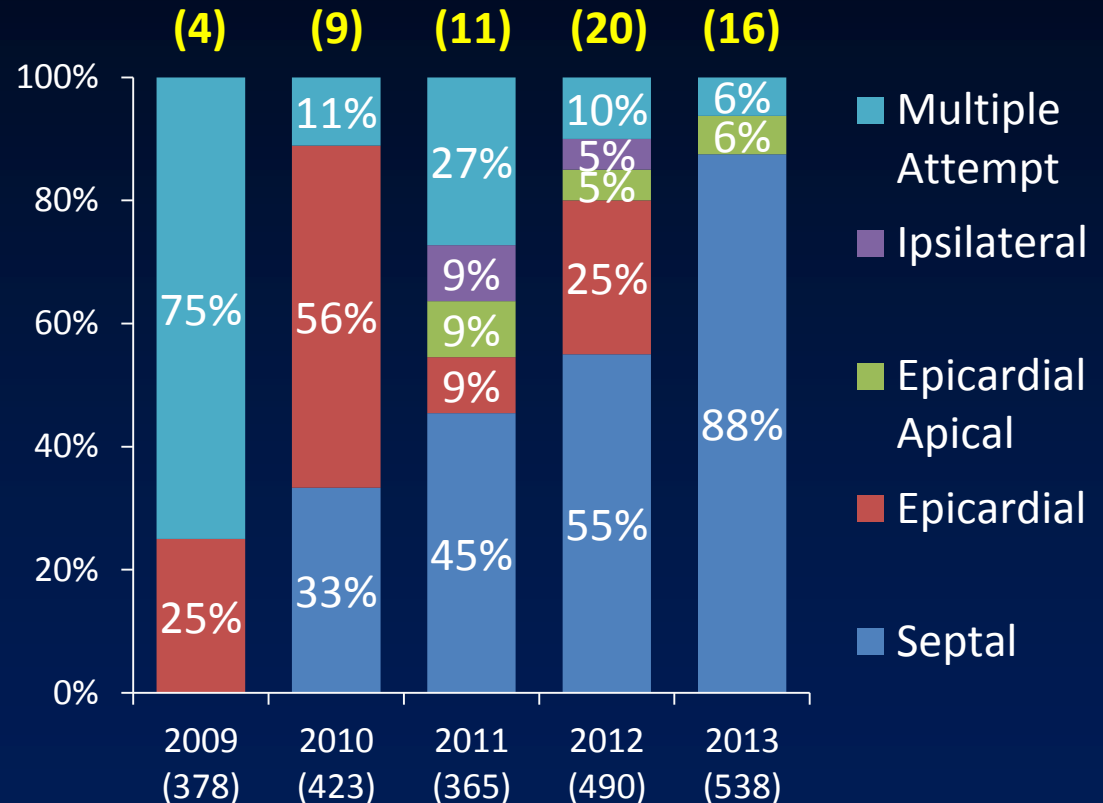
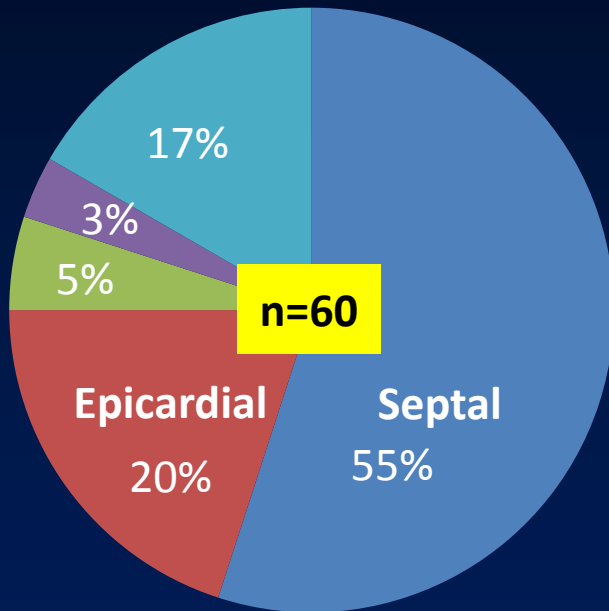
Collateral Channel Crossing

Used collateral channel



GW success for Channel crossing: 79.8% (1751/2194)

Treatment Required Channel Injury

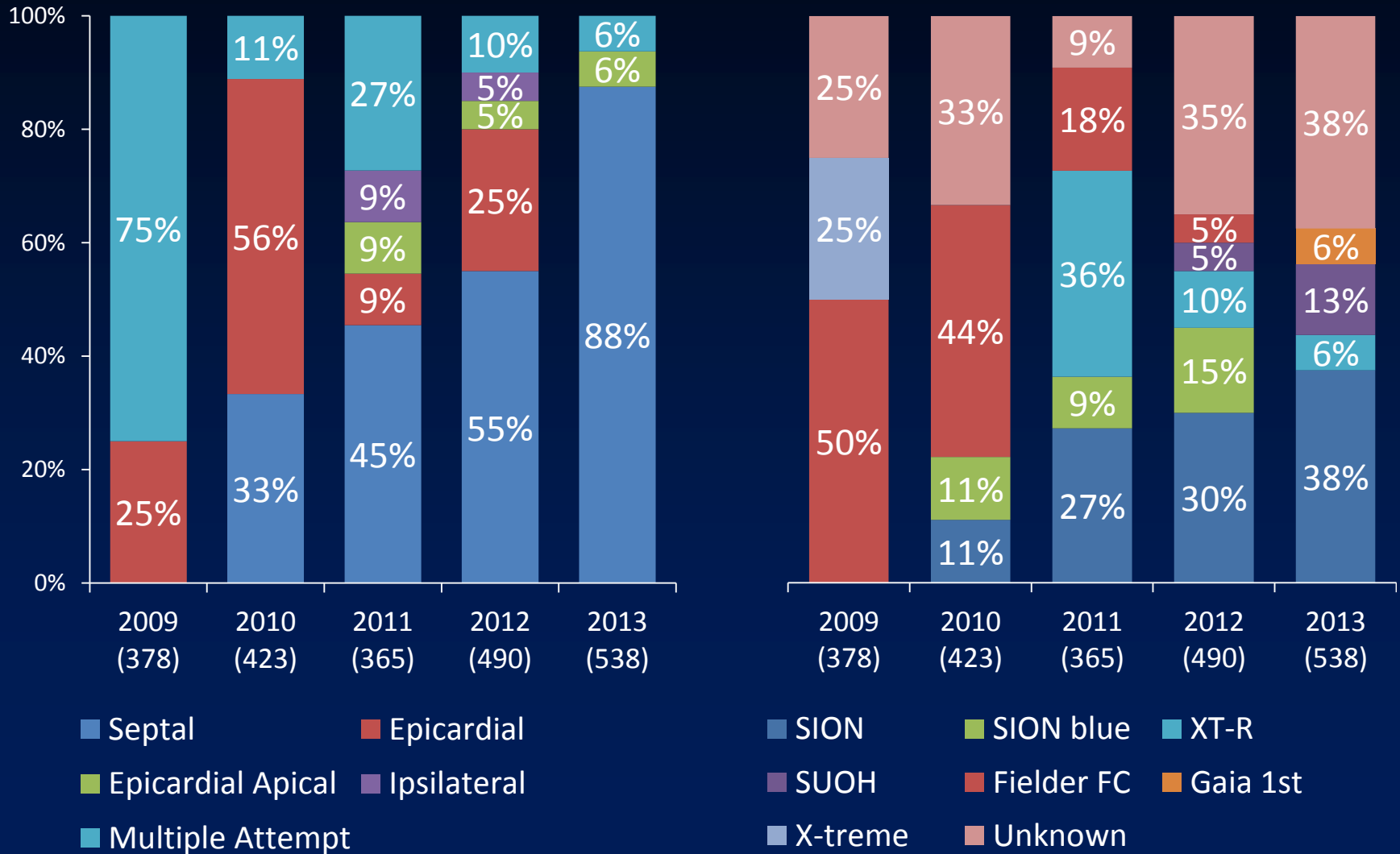


GW success for Channel crossing: 70.0% (42/60)

Procedure Success: 58.3% (35/60)

Treated Collateral Channel

Used Guidewire



Procedure related Complications

	Success (1823)	Failure (371)	p
Retro relevant events: 11.0% (241)	8.83% (161)	21.56% (80)	<.0001
Events at CTO site: 4.01% (88)	3.29% (60)	5.93% (22)	0.0146
Other events: 2.96% (65)	2.14% (39)	7.01% (26)	<.0001

	Success (1823)	Failure (371)	p
Channel injury: 9.57% (214/2194)	8.28% (151)	16.98% (63)	<.0001
Treatment Required: 2.78% (60)	2.41% (44)	4.31% (16)	0.0409
Cardiac Tamponade: 0.55% (12)	0.49% (9)	0.81% (3)	0.4534
Donor artery trouble: 0.50% (11/2194)	0.32% (7)	0.18% (4)	0.0844
Dissection Requiring Stent: 0.36% (8)	0.22% (5)	0.14% (3)	0.2349
Spasm: 0.09% (2)	0.09% (2)	0% (0)	
Ischemia due to Pre-existing Lesion: 0.05% (1)	0% (0)	0.05% (1)	
Thrombosis: 0% (0)	0% (0)	0% (0)	



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28% (60/214) of channel injury were required the hemostasis procedure



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Cardiac Tamponade: 0.55% (12)	0.49% (9)	0.81% (3)	0.4534



6% (12/214) of channel injury are associated with cardiac tamponade

0.0844

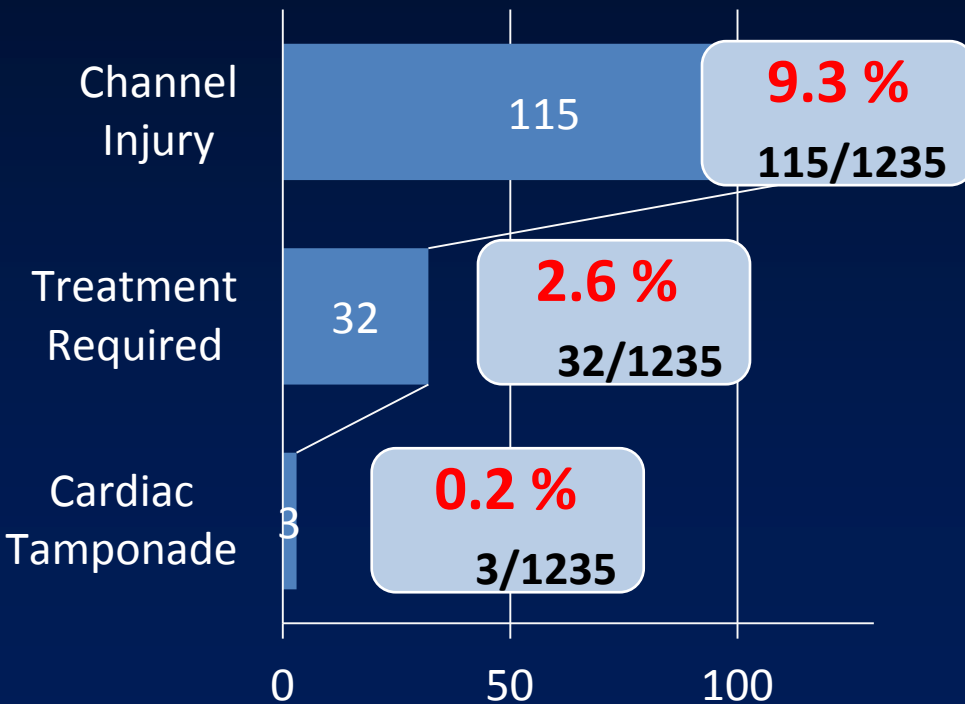
Dissection				
Spasm: 0.05% (1)	0.05% (1)	0% (0)	0.2349	
Ischemia due to Pre-existing Lesion: 0.05% (1)	0% (0)	0.05% (1)		
Thrombosis: 0% (0)	0% (0)	0% (0)		

Treatment for Channel Injury

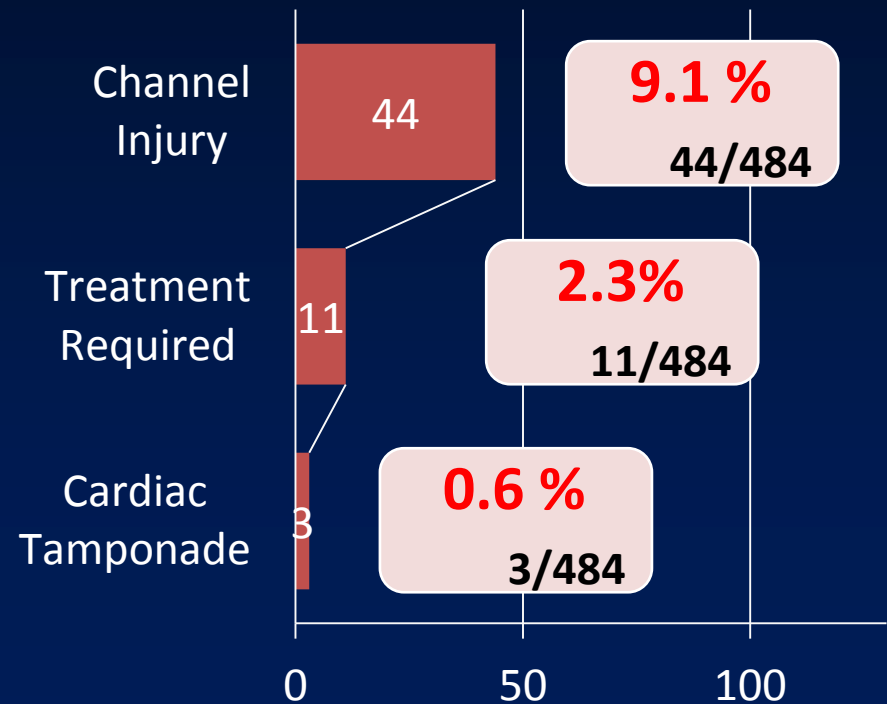
	(n=61)
Coil	11.5 (7)
Catheter (Balloon, Micro catheter)	4.91 (3)
Graft stent	1.64 (1)
Thrombus plug	1.64 (1)
Fatty plug	1.64 (1)
Fibrin gel	1.64 (1)
Hematoma puncture using GW	1.64 (1)
Unknown	75.41 (46)

Channel injury Detail

Septal Channel (n=1235)



Epicardial Channel (n=484)



In-hospital MACCE

	Overall (2194)	Success (1823)	Failure (371)
Overall	1.23% (26)	0.99% (18)	2.16% (8)
- Cardiac Death	0.27% (5)	0.11% (2)	0.54% (2)
- Non Cardiac Death	0.18% (5)	0.22% (4)	0.26% (1)
- QMI	0.14% (2)	0.05% (1)	0.26% (1)
- Non QMI	0.36% (8)	0.43% (8)	0.00% (0)
- Stroke	0.14% (3)	0.12% (2)	0.26% (1)
- Emergent CABG	0.09% (2)	0.00% (0)	0.54% (2)
- Emergent TVR	0.05% (1)	0.05% (1)	0.00% (0)