Aggressive Stenting Faux Pas

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Conflict of Interest Statement

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Physician Name	Company/Relationship
Charles A. Simonton MD	BSCI, Research Grants, Consultant Cordis, Research Grants Medtronic, Research Grants Abbott Vascular, Research Grants Conor MedSystems, Research Grants Spectranetics, Consultant Kensey-Nash, Consultant Medicines Company, Research Grants Possis, Research Grants, Consultant

Primary Types of "Faux Pas"

General Aggressive "Faux Pas"

- **Inadequate lesion preparation:**
  a. Insufficient pre-dilatation
  b. Insufficient debulking (rotablator for heavy calcium)
- **Stent "regret" due to #2:** inability to fully deploy and expand stent with balloon trapping or evulsion
- **Over-sizing of stent** resulting in major dissection or perforation (particularly in SVG PCI)
- **With hydrophilic wires**, failure to pay attention to the distal wire tip resulting in distal vessel or branch perforation
- **In long, aggressive cases, failure to monitor anticoagulation** resulting in thrombosis of wires, stents, or branch vessels

Primary Types of "Faux Pas"

General Aggressive "Faux Pas"

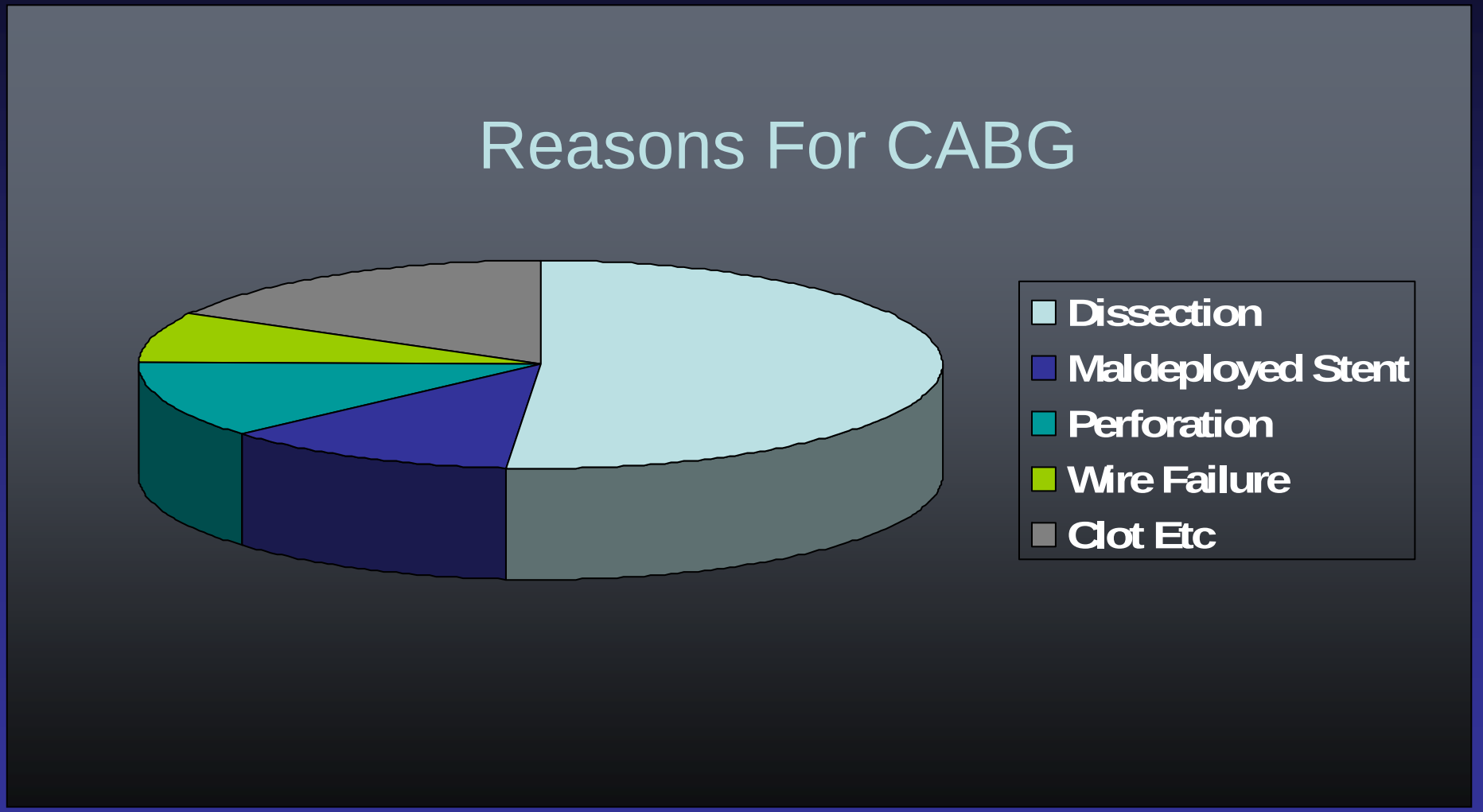
6. **Balloon dilatation and stenting of the wrong lumen** due to inadequate visualization (e.g. in CTO's) resulting in perforation
7. **Guide catheter-induced coronary injury: dissection**
8. **Stent dislodgement from delivery balloon,** either inside the coronary or in the aorta
9. **High-pressure balloon rupture** causing dissection, perforation, or unretrievable balloon
10. **No reflow due to unsuspected thrombus or plaque emboli,** usually in acute lesions (STEMI,NSTEMI, UAP patients)

Primary Types of "Faux Pas"

Lesion-Specific Aggressive "Faux Pas"

1. **In bifurcation stenting**, neglecting to prepare and protect side-branches, misplacement of stents in crush, poor dilatation of side-struts before placing second stent in Cullotte, or neglecting to finish with "kissing balloons"
2. **In Ao-ostial lesions**, failure to prepare lesion with adequate PTCA or debulking, and failure to use long-enough stent to avoid stent loss in aorta or missing the true ostium
3. **In SVG lesions**, failure to use embolic protection or stent the full length of the lesion; over-sizing of balloon/stent
4. **In CTO lesions,** over-aggressive wire placement with dissection, perforation; dilating/stenting the wrong channel with perforation; guide catheter injury
5. **In heavily calcified lesions,** inadequate debulking/pre-dilatation with stent "regret": lack of stent expansion

Emergent CABG in 41 Patients During 5875 PCI (0.7%) 1995-2000



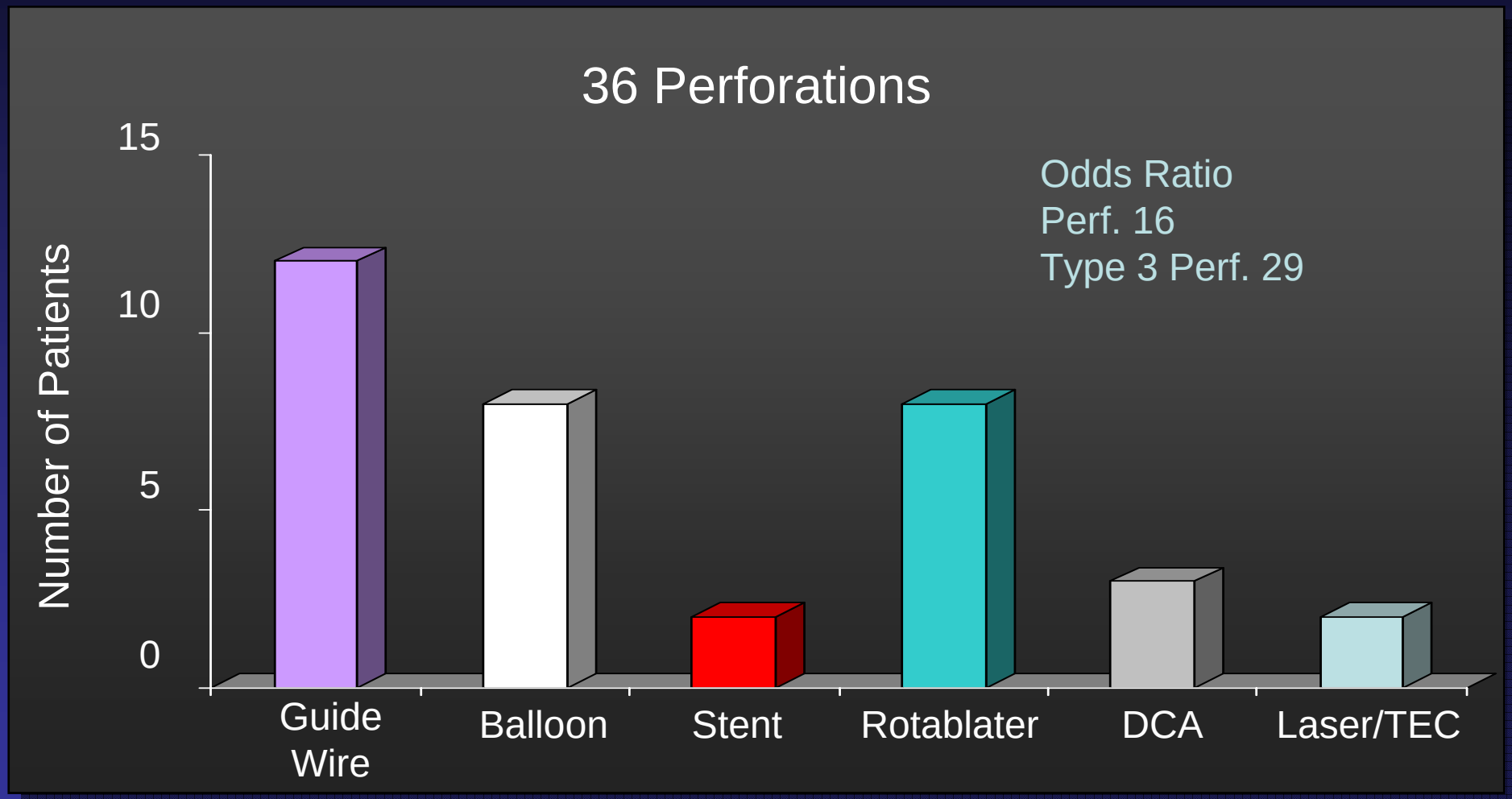
Hopkins et al CCI 2001;53:99

Coronary Perforation Classification

Type 1	Crater extending outside lumen only
Type 2	Pericardial or myocardial blush without > 1mm exit hole
Type 3	Contrast jet through > 1mm exit hole

Ellis et al. Circulation 1992; 88: I-787

Causes of Coronary Perforation During PCI 1995-1999 at Christ Hospital

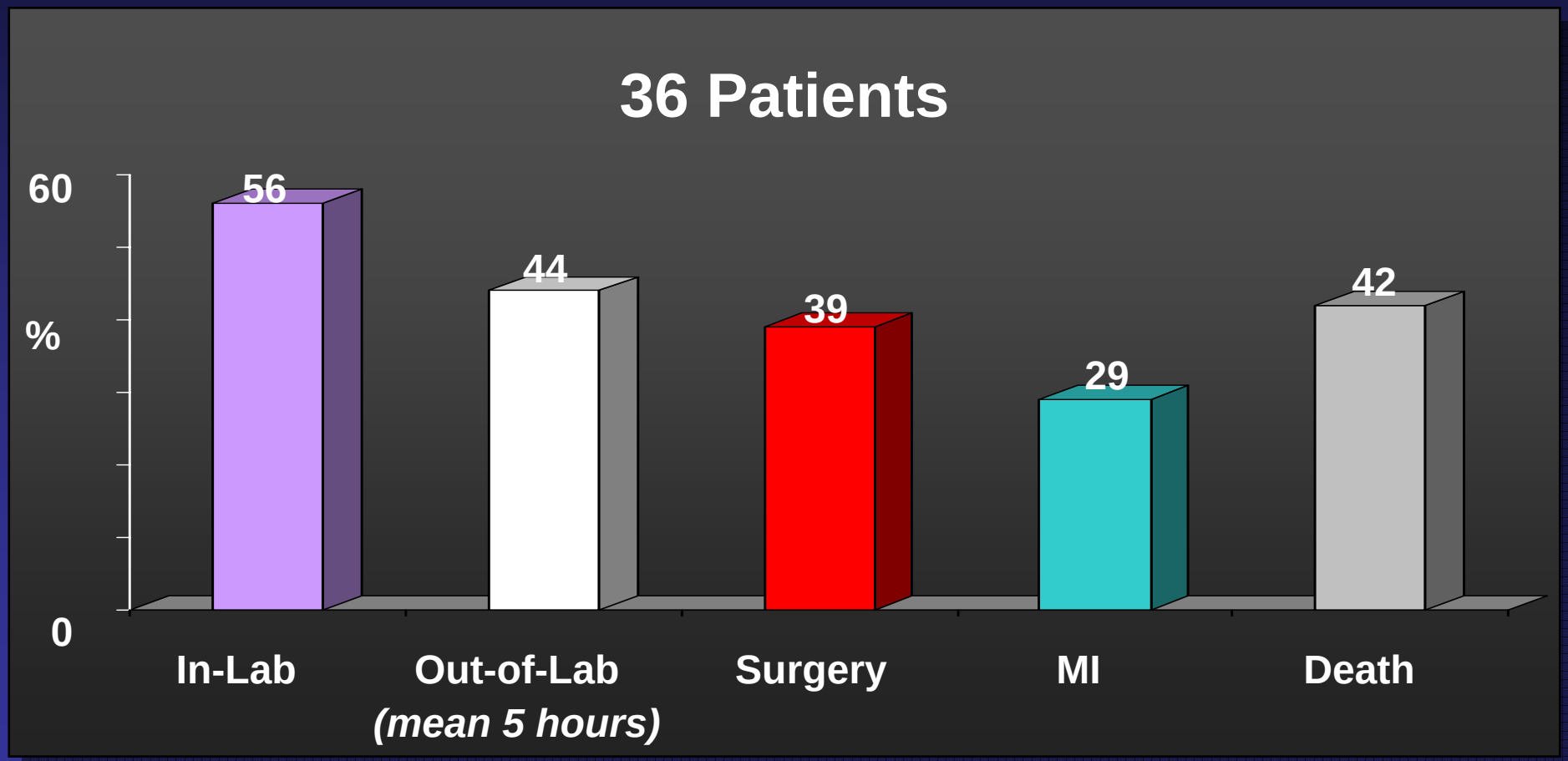


Dippel et al. Cathet Cardiovasc Intervent 2001; 52:279-286

Risk associated with Type 3 Perforation

	Ellis et al. 1992	*Dippel et al. 2001*
Tamponade	**63%**	**43%**
Surgery	**75%**	**50%**
QMI	**29%**	
Death	**14%**	**21%**

Cardiac Tamponade Complicating PCI – An 8 year experience at William Beaumont Hospital



Fejka et al. Circulation 2001; 104: II-417

JoMed PTFE Covered Stent for PCI Perforations

Multicenter Study of 35 Patients

Pericardial effusions	22%
Tamponade	14%
Complete Sealing	100%
Q Wave MI	0
Emergency Surgery	0
Death	0

Lansky et al. JACC 2000; 35: 26A

Iatrogenic Aortic Dissection

- Rare Complication
- Secondary to guide catheter trauma, injection of wedged catheter or balloon rupture

Class 1: Limited to coronary cusp

Class 2: Limited to cusp and proximal ascending aorta

Class 3: Extending to Aortic Arch

Coronary Dissection Remains a Significant Problem in the Stent Era

- Plaque fracture (due to balloon inflation or stent)
- Guide catheter or wire trauma
- Balloon rupture

Stent Maldeployment

- Imprecise placement
- Stent entrapment in uncrossable lesion
- Unexpandable lesion
- Sheared off by guide catheter
- Lost!

Stent Embolization

- Systemically – generally “safe”
- Intracoronary
  - Deploy (if on wire)
  - Crush (if off wire)
  - Retrieve with snare or wrapped in parallel guide wires

To Avoid Stent Misadventures with Aggressive Stenting

- Predilate difficult lesions (rigid or tortuous)
- Cutting balloon or rotablation for undilatable or calcified lesions
- Watch distal wire position and guide catheter
- Size balloons and stents appropriately
- Be prepared and be familiar with known types of complications, because even with good planning, aggressive stenting in complex lesions can lead to “faux pas” !