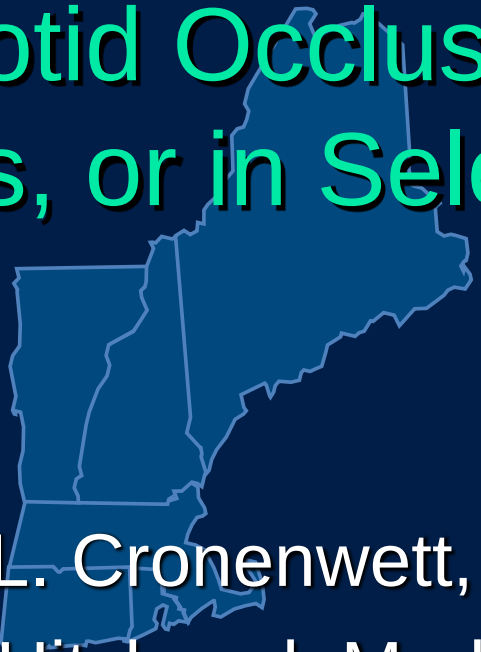
Shunting and Contralateral Carotid Occlusion: Never, Always, or in Selected Cases?



Jack L. Cronenwett, M.D.
Dartmouth-Hitchcock Medical Center

Vascular Study Group of New England

Disclosure

- I do not have any potential conflicts of interest.

Contralateral Carotid Occlusion (CCO)

1. Is stroke rate higher during CEA?
2. Are shunts required more often?
3. Should we all shunt all patients with CCO?

Stroke Rate during CEA with CCO

- NASCET trial showed higher stroke rate for CEA with contralateral carotid occlusion (CCO)
  - 2.3 x higher (14.3 vs. 5.1%)
  - (Stroke rate even higher under medical Rx)
- ACAS trial showed no effect of CCO
  - 2.3% vs. 2.2%, ns

- Multiple small studies with different outcomes

Stroke Rate during CEA with CCO Registry and Meta-Analyses

Contralateral ICA	**Patent**	Stroke	**Occluded**	Stroke	P
SVS Registry	10, 948	1.1%	666	3.2%	<.001
Meta Analysis*	11,511	2.4%	1,927	3.7%	<.002
Meta Analysis#	25, 726	1.9%	3,120	3.3%	<.001

* 19 Studies, 1984-2005, Maatz et al, Ann Vasc Surg, 2008
# 30 Studies, 1984-2012, Antoniou et, al, J Vasc Surg, 2013

- Stroke rate 1.5-1.7 x higher for CEA with CCO
- Variation in shunt use, local vs. general anesthesia

Shunt Requirement During CEA

- 1,212 CEA under local-regional anesthesia

Contralateral ICA Status	Stenosis <60%	Stenosis 60-99%	Occluded	P
n	958 (79%)	173 (14%)	81 (7%)	
Shunt Required	6%	6%	26%	<.001
Stroke or Death	2.6%	2.3%	1.2%	.74

Logistic regression predictors of shunt requirement:
Contralateral occlusion (OR 5.7)
Severe renal insufficiency (OR 2.1)

- Kretz et al, Ann Vasc Surg, 2012

Shunt Requirement based on MRA

- 431 CEA under general anesthesia
  - 88% Symptomatic
- 65 (15%) required by shunt for EEG changes
- Multivariate predictors of shunt requirement:
  - Contralateral carotid occlusion O.R. = 4.3
  - Incomplete circle Willis O.R. = 5.0
  - Ipsilateral ICA stenosis > 90% O.R. = 0.15
- Collateral circulation predicts need for shunt

- Pennekamp et al, Eur J Vasc Endovasc Surg, 2013

Contralateral Carotid Occlusion

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   Yes – 1.5-1.7 x higher

2. Are shunts required more often?

   Yes – 4-5 x more often

3. Should we all shunt all patients with CCO?

CEA Without Shunting

- CCO can be done safely without shunting
- Experienced surgical group
- 147 CEA with contralateral carotid occlusion
- General anesthesia, no shunts
  - BP > 130, Clamp time mean 20 minutes

- Stroke, death rate = 1.4%

- Sampson et al, J Vasc Surg, 2013

CEA and Contralateral Occlusion

- If contralateral carotid occlusion increases stroke risk during CEA and increases need for shunting, how can CEA be done safely by some groups without the need for shunting?

Vascular Study Group Of New England

VSGNE

Regional Quality Improvement Collaborative

- 30 Centers
  - 15 Academic
  - 15 Community
- Prospective data collection
  - Major vascular procedures
  - Since 2003
- Large number procedures
- “Real World” practice

Carotid Endarterectomy in VSGNE

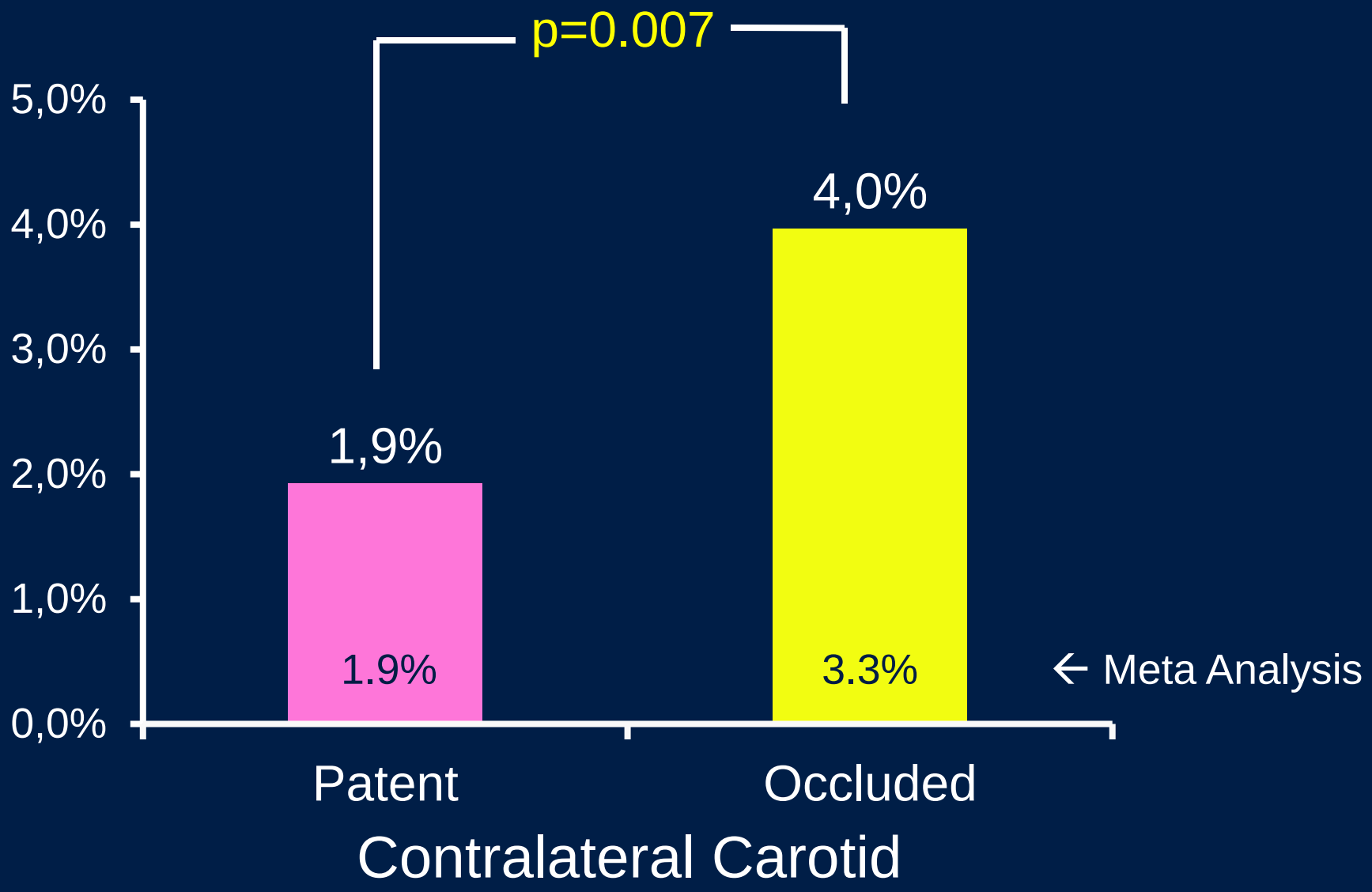
- 5,263 Carotid Endarterectomy, 2003-2009
  - Excluded: redo CEA, combined CABG
  - Contralateral carotid assessed by pre-op duplex
- Study cohort:

5,279 CEAs With A Patent Contralateral ICA	353 CEAs With Contralateral Carotid Occlusion (6%)

(SVS Registry: 6% CCO (Ricotta, J Vasc Surg 2012)

- Goodney et al, J Vasc Surg 2012

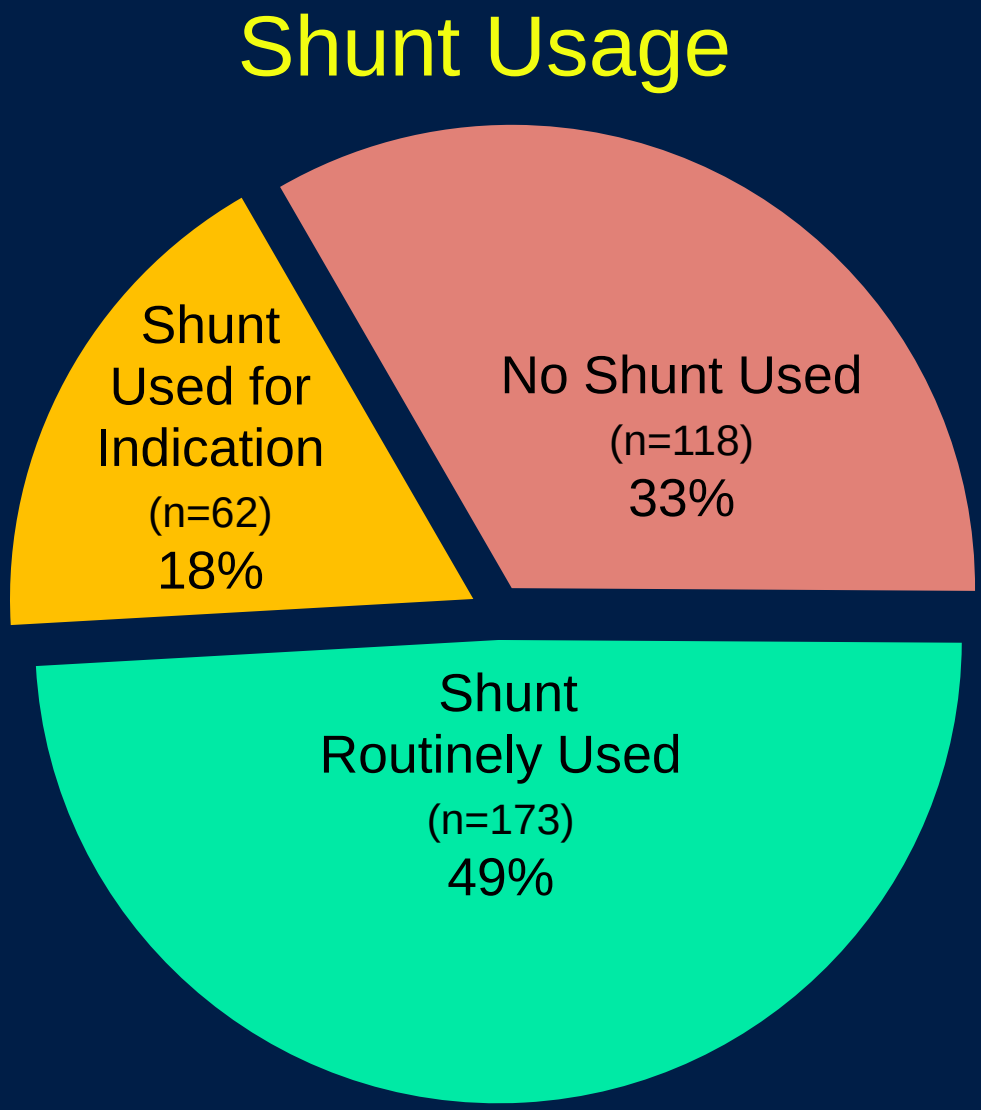
30-Day Stroke or Death after CEA



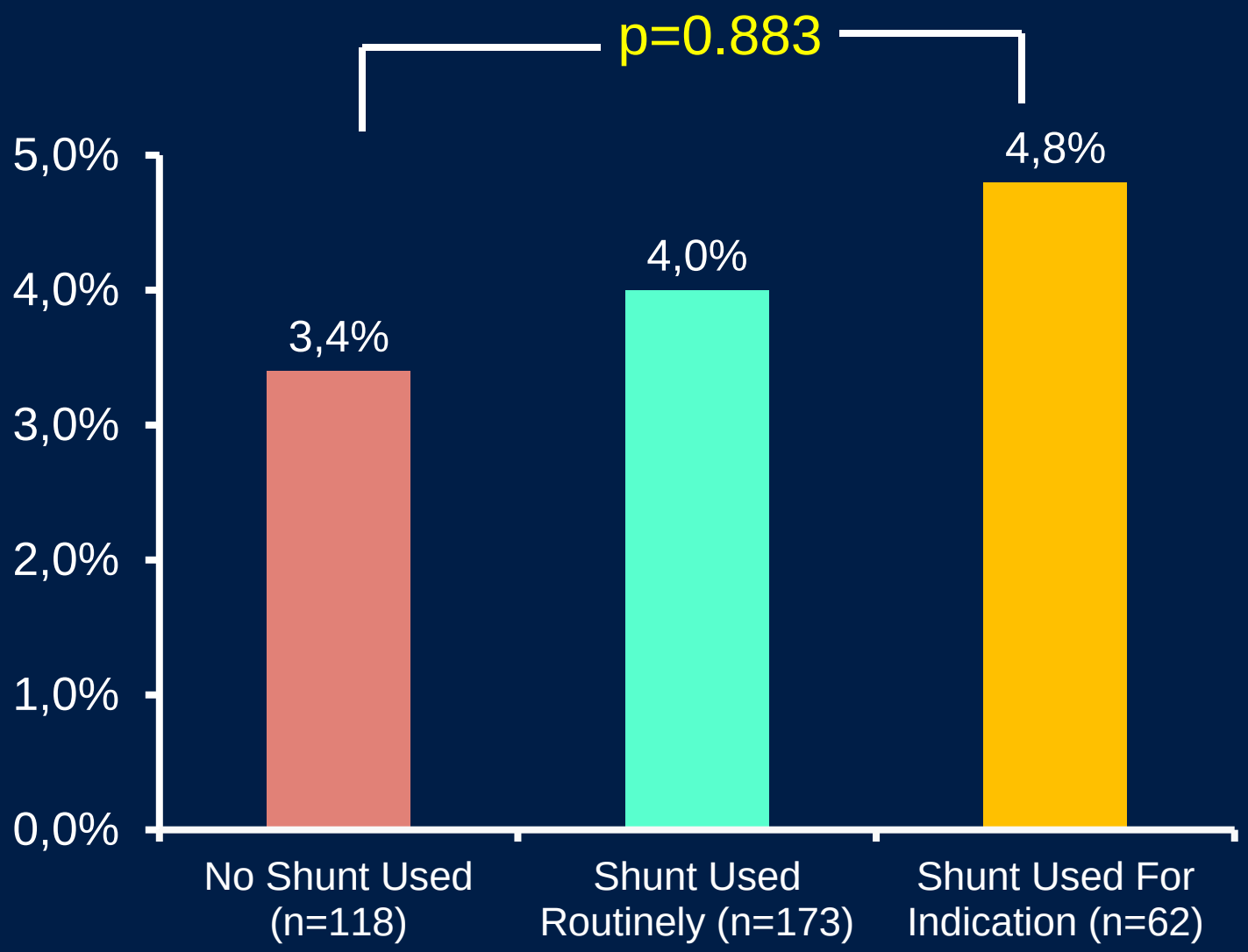
353 Patients with Contralateral Occlusion

- General Anesthesia: 94%
- Conventional CEA: 90%
- Patch Use: 84%
- Symptomatic: 39%

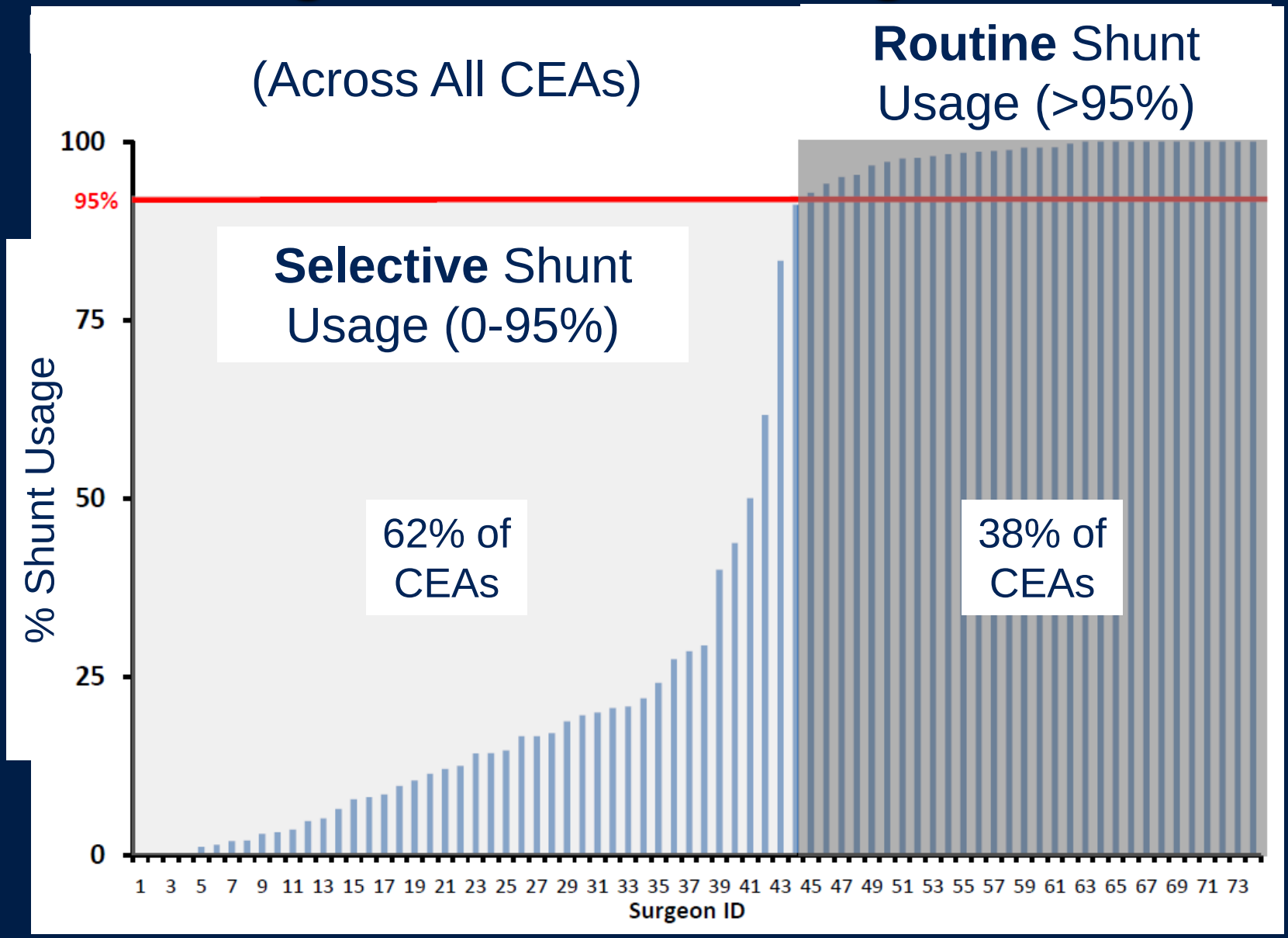
- Shunt Used: 67%



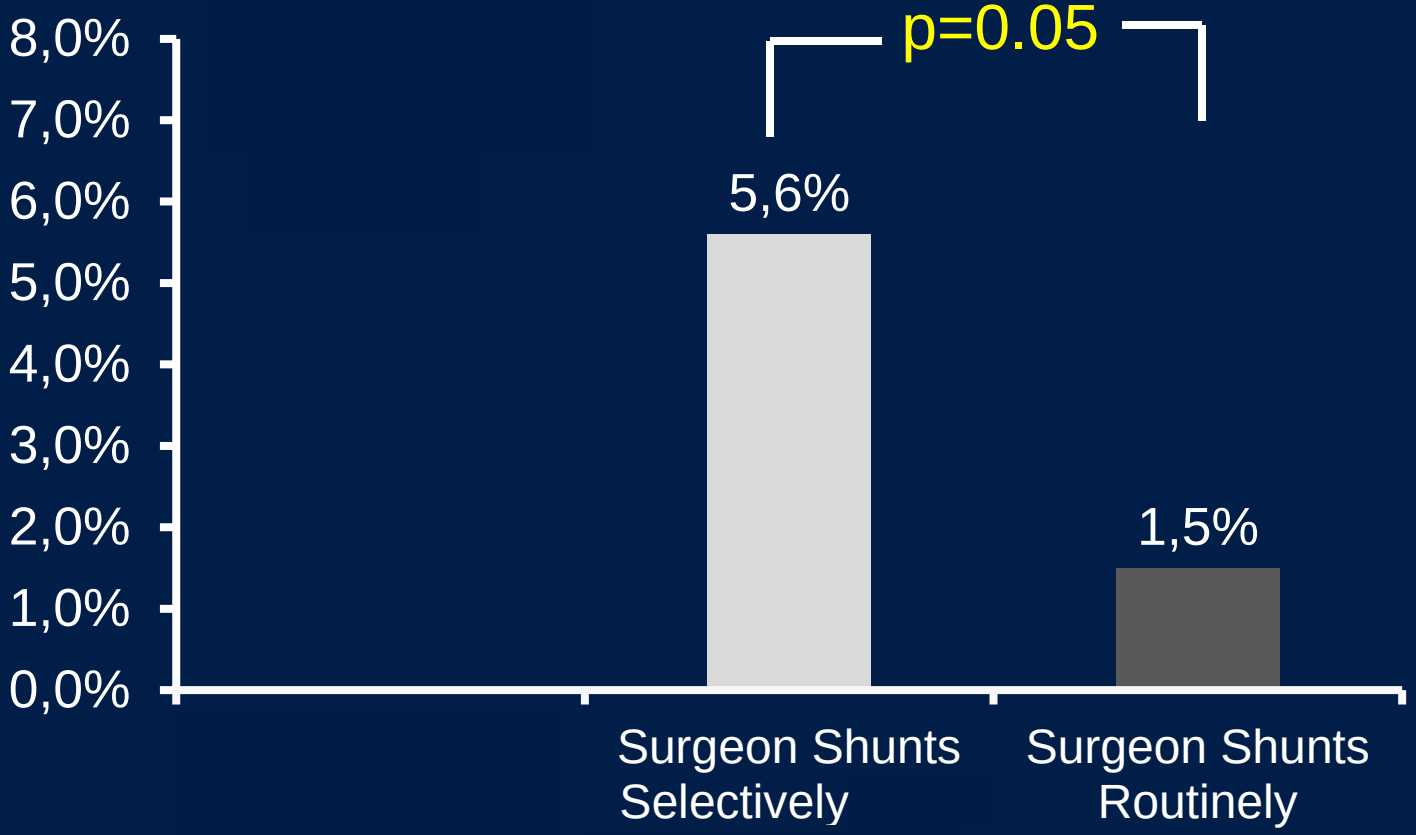
30-Day Stroke or Death, by Shunt Type



Surgeon Shunt Usage Pattern



30-Day Stroke or Death, by Surgeon Shunt Usage Pattern



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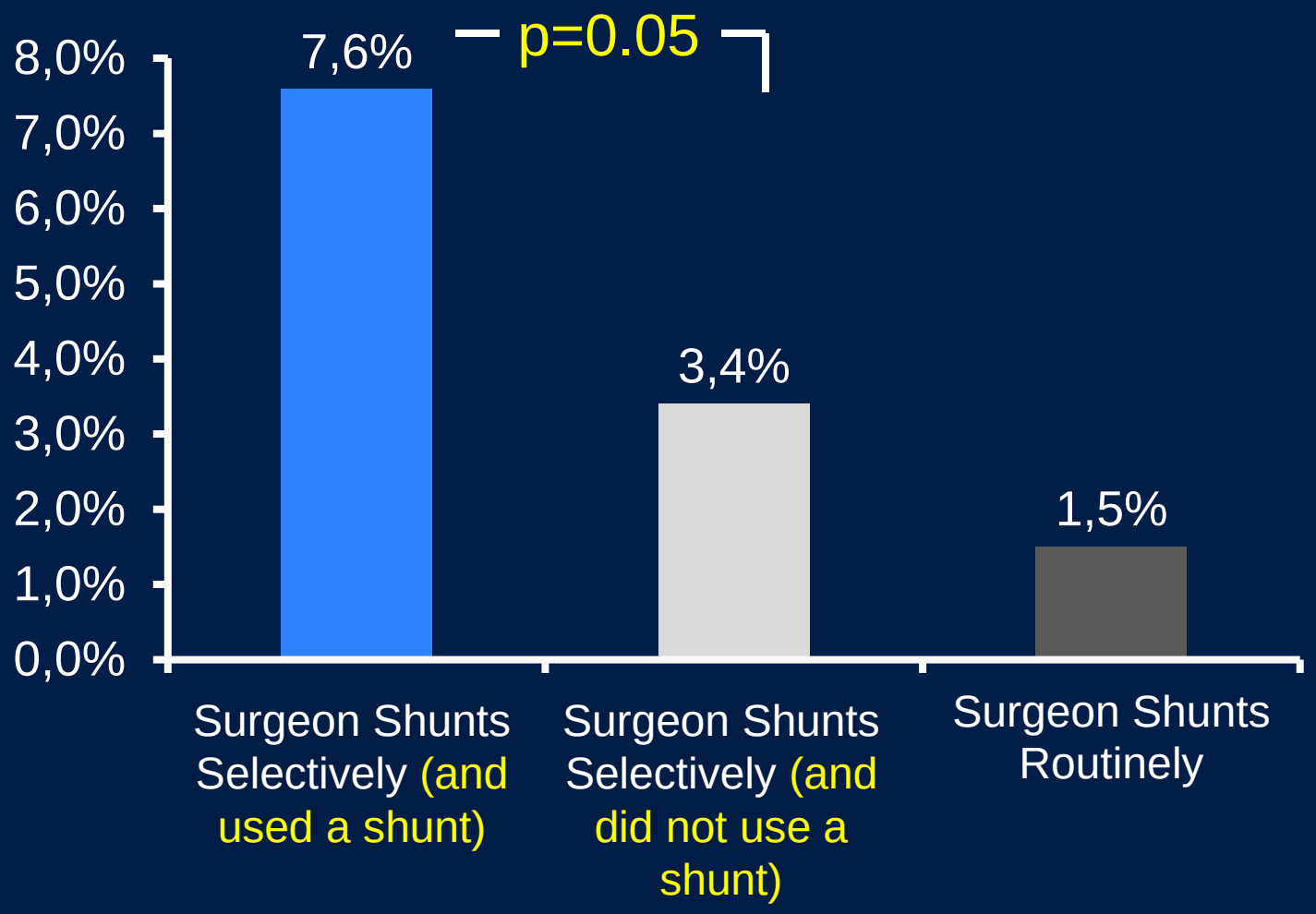

Multivariable Analysis

- Account for potential differences in patient mix by calculating observed to expected ratio for stroke/death by surgeon shunt usage pattern:

• Routine shunt use:	O/E = 0.4	[0.2-0.8]
• Selective, no shunt:	O/E = 0.9	[0.7-1.2]
• Selective, used shunt:	O/E = 1.7	[1.2-2.1]

P<.05

Implications

- Complex processes of care (such as shunt placement) are best performed by surgeons who use them frequently

- The safest operation a vascular surgeon can perform in a patient with a CCO is the operation they would perform if the CCO were not present.

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   Yes – 1.5-1.7 x higher

2. Are shunts required more often?

   Yes – 4-5 x more often

3. Should we all shunt all patients with CCO?

   No

- Local anesthesia: Use shunt for neurologic deficit
- General anesthesia: Use shunt only if surgeon uses a shunt routinely for all CEAs

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