Balanced study: Depth of anaesthesia and delirium

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In this talk I will speak about the magnitude of the problem of postoperative delirium, preventing delirium using the BIS monitor, and offer some advice and conclusions.
Postoperative delirium (POD) is part of a spectrum of disorders that have recently been described as "perioperative neurocognitive disorders (PND)".[1] POD is an acute onset fluctuating change in mental status characterized by a reduced awareness of the environment and disturbance of attention. It is common in the first seven days postoperatively, particularly in older adults. POD is associated with adverse outcome including increased risk of death in elderly patients. However there is inadequate research about how to prevent or treat it including:[2]

- Association of postoperative delirium with poor outcome not clearly defined
- Anti-inflammatory studies in animals not replicated in humans
- Effects of risk factor modification and lifestyle improvement not tested
- Use of anticholinesterases not explored perioperatively
- Choice of anaesthetic not proven to influence outcome
- Effect of depth of anaesthesia uncertain

As more than 300 million people have surgery every year and an increasing number of them are elderly and at risk of delirium, more action is required.
The pathophysiologic basis for delirium is uncertain. Anaesthesia and surgery are associated with immunosuppression, inflammation and hypotension. These may be greater with deep anaesthesia.[3] More than nine studies investigated the association between deep anaesthesia and delirium. Their methodologies have varied widely:

Paper	**n**	**Surgery**	**Tests**	**Follow-up**	**Groups**
Wong 2002[4]	68	TJA	Chart	3 days	Routine vs. BIS 50-60
Sieber 2010[5]	114	#NOF	CAM	2 days	BIS=50 vs. BIS>80
Jildenstal 2011[6]	450	Eyes	MMT	1 month	Routine vs. AEP
Ballard 2012[7]	74	Non-cardiac	MMSE	1 year	Routine vs. BIS
Chan 2013[8]	902	Non-cardiac	CAM	3 months	Routine vs. BIS
Radtke 2013[9]	1,155	Non-cardiac	DSM-IV	3 months	Routine vs. BIS
Whitlock 2016[10]	310	Cardio-thoracic	CAM	10 days	ETAC vs. BIS
Sieber 2018[11]	200	#NOF	CAM	5 days	OAA/S 0-2 vs. OAA/S 3-5

Wildes 2019[12]	1,232	Major surgery	CAM	5 days	Routine vs. BS avoidance

Most studies have reported more delirium in the deep group than the light group, sometimes at a statistically significant level. Only one has shown more delirium in the light group than the deep group (Wildes 2019):

Paper	**n**	**Surgery**	**Groups**	**Delirium**
Wong 2002	68	TJA	Routine vs. BIS 50-60	1 vs. 0
Sieber 2010	114	#NOF	BIS=50 vs. BIS>80	40% vs. 19%
Jildenstal 2011	450	Eyes	Routine vs. AEP	16 vs. 2
Ballard 2012	74	Non-cardiac	Routine vs. BIS	89% vs. 58%
Chan 2013	902	Non-cardiac	Routine vs. BIS	24% vs. 16%
Radtke 2013	1,155	Non-cardiac	Routine vs. BIS	21% vs. 17%
Witlock 2016	310	Cardio-thoracic	ETAC vs. BIS	28% vs. 19%
Sieber 2018	200	#NOF	BIS=50 vs. BIS>80	39% vs. 34%
Wildes 2019	1,232	Major surgery	Routine vs. BS avoidance	23% vs. 26%

We conducted a delirium sub-study of the Balanced Anaesthesia Study at 8 participating sites in Australia, China and the United States. The manuscript from this paper is currently under review at a journal. The results will be presented at the Auckland City Symposium.

References

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