Effects of CPAP on Postoperative Outcomes in Obstructive Sleep Apnea Patients Undergoing Surgery: A Systematic Review and Meta-analysis.

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Introduction

- Obstructive sleep apnea (OSA) is associated with a higher risk of postoperative adverse events.
- The objective of this meta-analysis was to investigate the effectiveness of CPAP in reducing perioperative Apnea Hypopnea Index (AHI), Length of hospital stay (LOS) and the risk of postoperative adverse events in OSA patients undergoing surgery.

Methods

- **Inclusion Criteria**
  - All published studies in English language.
  - Adult OSA surgical patients using perioperative CPAP or no-CPAP.
- **Exclusion Criteria**
  - * Case reports.
  - * Studies with no information on control patients.
  - * Studies in which patients underwent upper airway surgery.

Summary & Conclusion

- **Preoperative AHI was reduced significantly by an average of 25 events/h postoperatively.** The preoperative baseline AHI without CPAP was reduced significantly with postoperative CPAP use (preoperative AHI vs. postoperative AHI, 37±19 vs 12±16 events/h, P<0.001).
- **The length of hospital stay was 0.4 days shorter in CPAP group compared to the no CPAP group.** LOS showed a trend towards significance for CPAP group vs no-CPAP group (4.0±3.8 vs. 4.4±8.2 days; P=0.05).
- **There was no significant difference in adverse events** between the CPAP versus no-CPAP group. There was a 12% risk reduction in CPAP group.
- Further research is needed in the area of **preoperative and postoperative CPAP use.**

Figure 1 - Extraction of the data on postoperative adverse events, Length of Hospital Stay (LOS) and Apnea-hypopnea index (AHI)

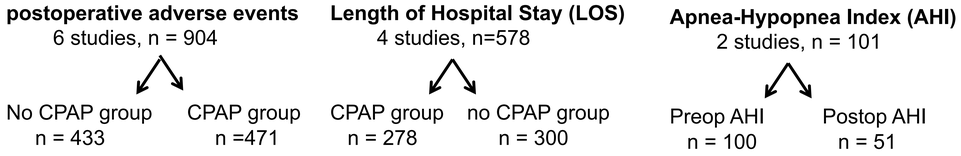


Figure 2. Forest plot of the association of length of hospital stay in OSA patients with CPAP vs. no-CPAP treatment

Study or Subgroup	CPAP Mean	CPAP SD	CPAP Total	No CPAP Mean	No CPAP SD	No CPAP Total	Weight	Mean Difference IV, Fixed, 95% CI
Gupta 2001	6	2.1	33	7.2	3.1	68	60.4%	-1.20 [-2.23, -0.17]
Jensen 2008	3.6	1.8	144	2.9	11.2	140	18.1%	0.70 [-1.18, 2.58]
Liao 2013	3.5	6.2	87	4.3	5.5	90	21.4%	-0.80 [-2.53, 0.93]
Rennotte 1995	8.2	3.5	14	24.5	14.8	2	0.2%	-16.30 [-36.89, 4.29]
Total (95% CI)			**278**			**300**	**100.0%**	**-0.79 [-1.59, 0.01]**

Heterogeneity: Chi² = 5.21, df = 3 (P = 0.16); I² = 42%

Test for overall effect: Z = 1.95 (P = 0.05)

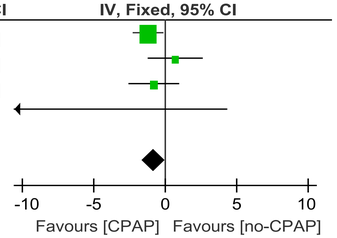
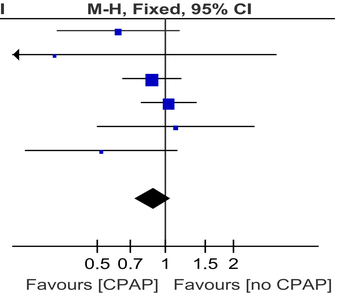


Figure 3 Forest plot of the association of postoperative adverse events in OSA patients with CPAP vs. no-CPAP treatment.

Study or Subgroup	CPAP Events	CPAP Total	No CPAP Events	No CPAP Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Gupta 2001	9	33	30	68	14.6%	0.62 [0.33, 1.15]
Jensen 2008	1	144	3	140	2.3%	0.32 [0.03, 3.08]
Liao 2009	61	150	42	90	39.0%	0.87 [0.65, 1.17]
Liao 2013	47	87	47	90	34.3%	1.03 [0.78, 1.36]
O'Gorman 2013	10	43	9	43	6.7%	1.11 [0.50, 2.46]
Rennotte 1995	6	14	2	2	3.1%	0.52 [0.24, 1.12]
Total (95% CI)		**471**		**433**	**100.0%**	**0.88 [0.73, 1.06]**
Total events	134		133			

Heterogeneity: Chi² = 5.45, df = 5 (P = 0.36); I² = 8%

Test for overall effect: Z = 1.32 (P = 0.19)



Results

Table 1 - Data on AHI

Author	Preoperative AHI N	Preoperative AHI Mean±SD	Preoperative AHI Median(range)	Postoperative AHI N	Postoperative AHI Mean±SD	Postoperative AHI Median(range)	P Value
Liao 2013	87	34±17	30(15-104)	40	10±17	3(0.0-83)	<0.001
Rennotte 1995	13	55±22	59(23-89)	11	18±13	16(4-49)	<0.001
Total	100	37±19	32 (15-104)	51	12±16	5(0-83)	<0.001

Table 2 Data on CPAP use in the included studies

Author	Preoperative CPAP		Postoperative CPAP		Comments
Rennotte 1995	Yes	14	Yes	14	Home CPAP + continuous postoperative CPAP 24-48h and then night time only
Gupta 2001	Yes	33	Yes No	<17 16	<50% of the home CPAP patients continued CPAP on first postoperative night
Jensen 2008	Yes	144	No	144	Home CPAP/BiPAP approximately 10-16cm H_2O
Liao 2009	Yes	150	Yes No	94 56	62% of the home CPAP patients continued CPAP postoperatively
Liao 2013	Yes	87	Yes	87	2-3 days home APAP + 5 nights postoperative APAP
O'Gorman 2013	No	43	Yes	43	APAP 5-15cm H_2O, started in PACU, continued at night and while sleeping
Total	428(91%)		254		Nearly 50% of the patients on home CPAP continued CPAP postoperatively 43 patients (9%) did not receive home CPAP. 54 % of patients received postoperative CPAP

Reference

1. Liao P et al. Anesthesiology 2013;119:837–47.
2. Rennotte et al Chest 1995;107:367–74.
3. Gupta et al. Mayo Clin Proc 2001;76:897–905.
4. Jensen et al. Surg Obes Relat Dis 2008;4:512–4.

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