

Literature Search String

((adaptive[All Fields] AND servo[All Fields] AND ("ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "respiration"[MeSH Terms] OR "respiration"[All Fields])) OR ASV[All Fields]) AND ("sleep apnoea syndromes"[All Fields] OR "sleep apnea syndromes"[MeSH Terms] OR ("sleep"[All Fields] AND "apnea"[All Fields] AND "syndromes"[All Fields]) OR "sleep apnea syndromes"[All Fields]) AND (("2010/06/01"[PDAT] : "2015/10/31"[PDAT]) AND "humans"[MeSH Terms] AND English[lang] AND "adult"[MeSH Terms])

Table S1 – Summary of findings for ASV

ASV for CSAS in CHF patients

References: Artz 2008 (A); Artz 2013 (B); Campbell 2012 (C); Carnevale 2011 (D); Cowie 2015 (E); Fietze 2008(F); Joho 2012 (G); Kasai 2010(H); Kasai 2013 (I); Kourouklis 2013 (J); Koyama 2010 (K); Koyama 2013 (L); Miyata 2012 (M); Oldenburg 2008(N); Oldenburg 2011 (O); Oldenburg 2013 (P); Owada 2013 (Q); Pepperell 2003(R); Philippe 2006(S); Randerath 2012 (T); Suzuki 2014 (U); Szollosi 2006(V); Yoshihisa 2011 (W); Yoshihisa 2012 (X); Yoshihisa 2013 EJHF (Y); Yoshihisa 2013 Heart (A); Zhang 2006 (AA)

Outcomes	Quality of the evidence (GRADE)	Absolute Effect ASV (Pre-Post treatment) ¹	No of Participants (studies)
Left Ventricular Ejection Fraction (follow-up 0.5-6 months; measured with: %; Better indicated by higher values)	⊕⊕⊕⊖ low ^{2,3}	The LVEF in the ASV group was 5.49% higher (4.16% to 6.82% higher)	426 (17 studies) ^{B,D,F-I,M-O,P-U,W,Y,AA}
Apnea-Hypopnea Index (follow-up 0.005 - 6 months; measured with: No./hr sleep; Better indicated by lower values)	⊕⊕⊕⊖ low ^{2,3}	The AHI in the ASV group was 30.63 events lower (26.98 to 34.28 lower)	638 (27 studies) ^{A-D,F-AA}
		Relative Effect	
		Baseline Risk	Comparative Risk
Mortality (Cardiac Death) (follow-up 12-31 months; measured with: events; Better indicated by lower RR)	⊕⊕⊕⊕ high	198 per 1,000 patients	247 per 1,000 patients (202 to 304) RR 1.25 (1.02 to 1.53)
			1325 (1 study) ^F

¹ Results vs. baseline; patients served as their own controls

² Combination of randomized and non-randomized studies

³ Studies generally funded by industry

Figure S1 - Meta-analysis of LVEF from before-after ASV treatment trials

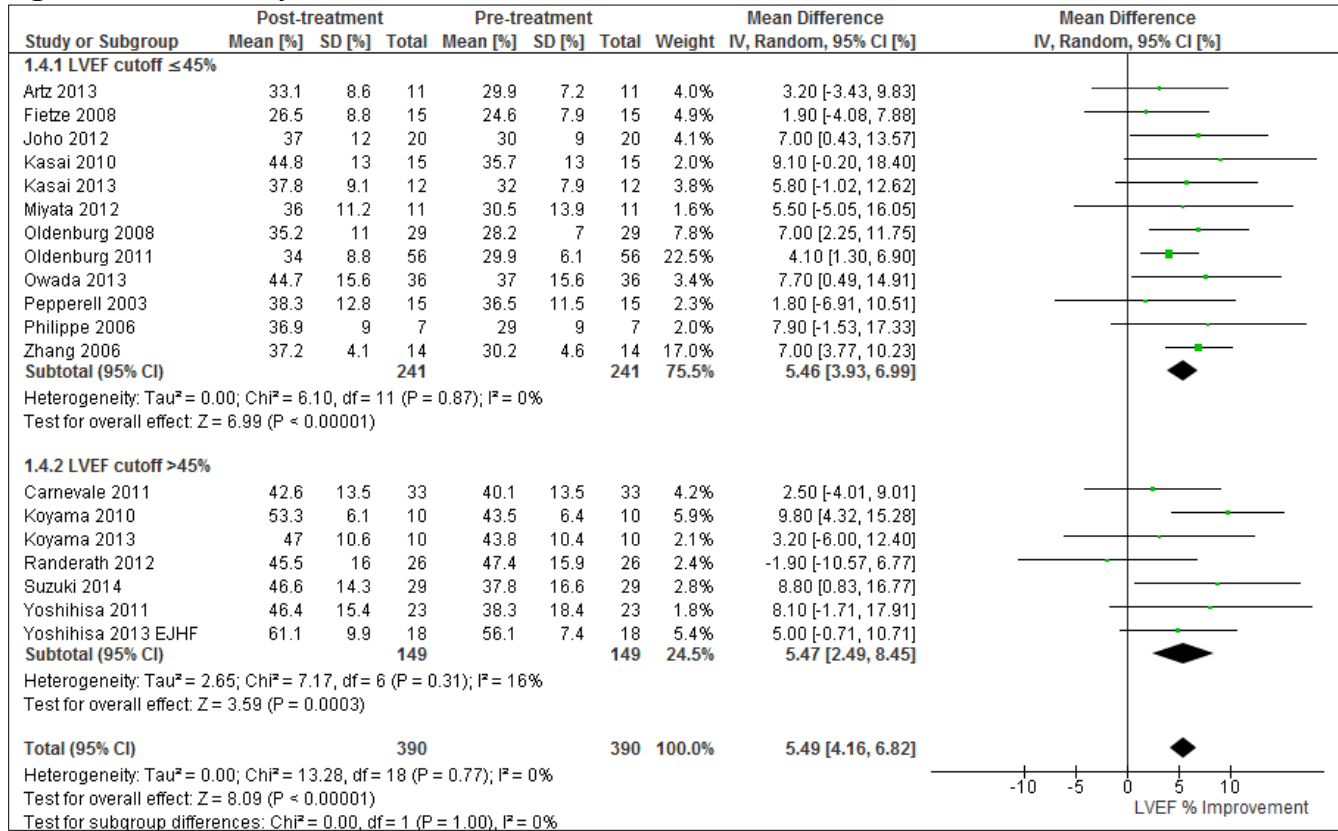


Figure S2 – Meta-analysis of AHI from before-after ASV treatment trials

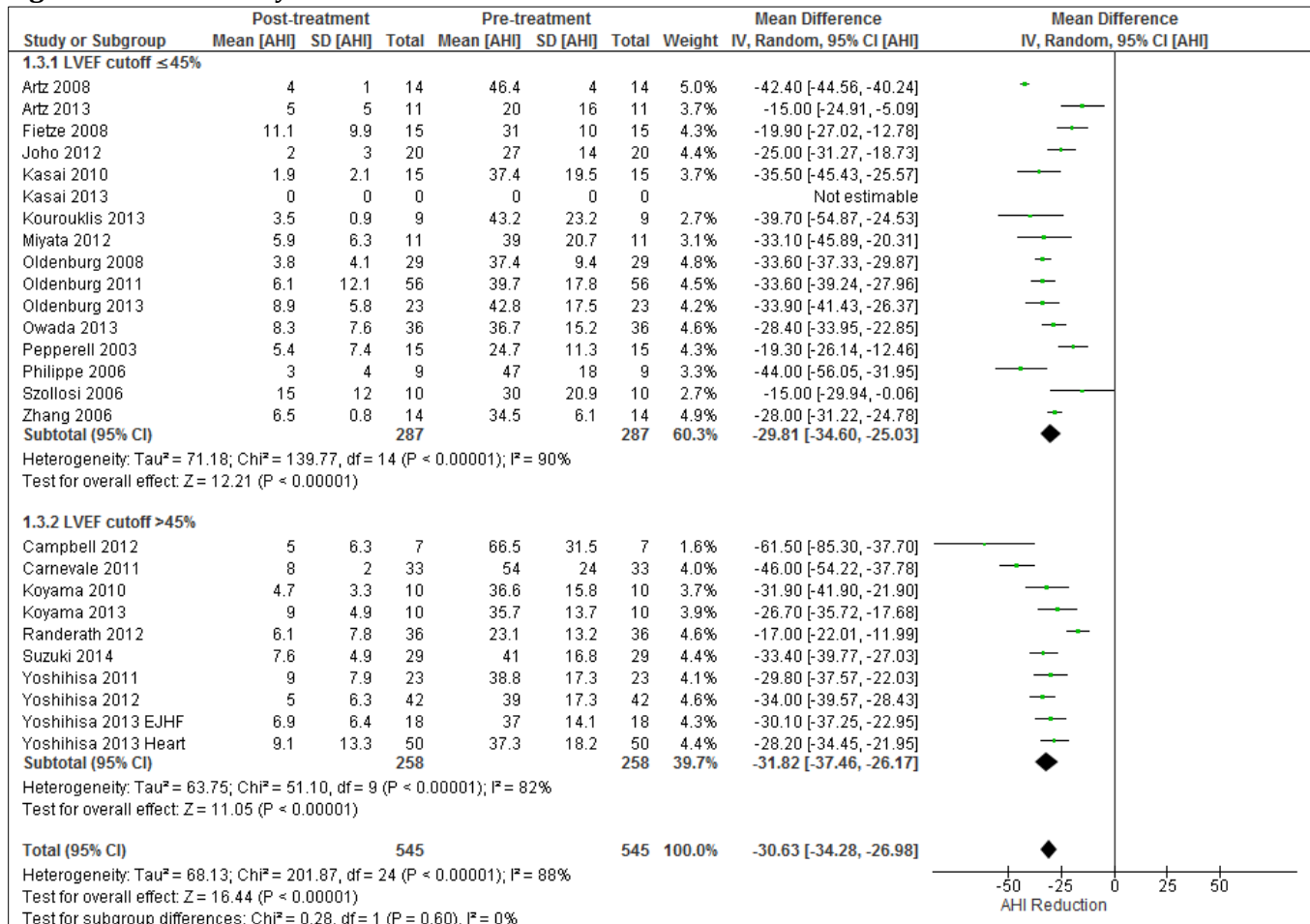


Figure S3A – Risk of cardiac death after ASV treatment vs standard care (for recommendations)

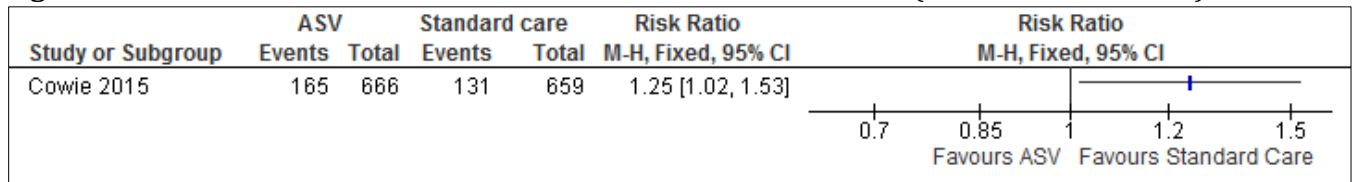


Figure S3B – Risk of cardiac death after ASV treatment vs standard care (all studies)

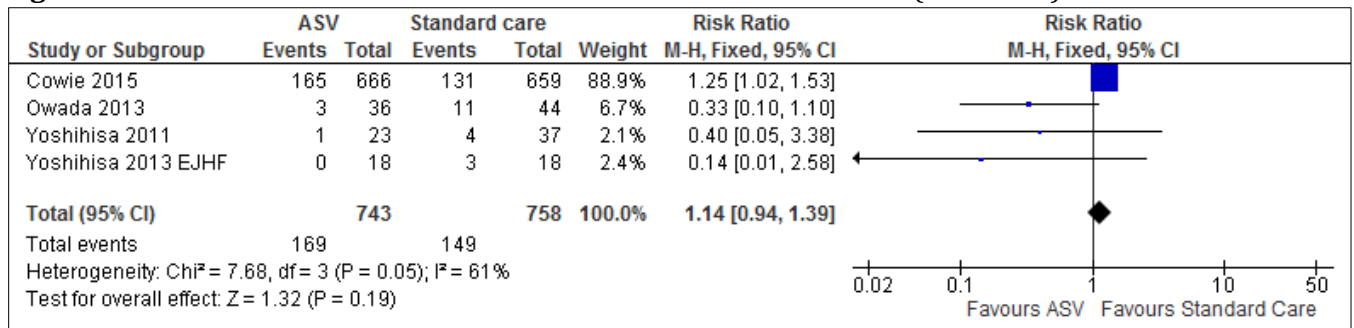


Table S2: LVEF Data; ASV

Author, Yr	Control Treatment	Duration	n (treatment/control)	Test Treatment		Control Treatment	
				Baseline	After	Baseline	After
Artz 2013	Standard care	12 wks	11/10	29.9 ±7.2	33.1 ±8.6	29.4 ±6.9	31.7 ±8.9
Bitter 2013	Standard care	12 wks	96/86	32 (23, 40)	4.3 ±4.0	33 (24, 44)	N/A
Carnevale 2011	None	36 mo.	33	40.1 ±13.5	42.6 ±13.5*	N/A	
Fietze 2008	BPAP-S/T	6 wks	15/15	24.6 ±7.9	26.5 ±8.8	25.5 ±9.2	31.1 ±10.5
Joho 2012	Standard care	~3.5 mo.	20/12	30 ±9	37 ±12	34 ±9	31 ±9
Kasai 2010	CPAP	3 mo.	15/15	35.7 ±12.9	44.8 ±12.9	36.0 ±8.1	37.9 ±N/A
Kasai 2013	CPAP	3 mo.	12/11	32.0 ±7.9	37.8 ±9.1	32.9 ±5.9	31.9 ±6.1
Koyama 2010	Standard care	4 wks.	10/7	43.5 ±6.4	53.3 ±6.1	45.7 ±9.5	45.6 ±9.7
Koyama 2013	Standard care	6 mo.	10/9	43.8 ±10.4	47.0 ±10.6	40.6 ±15.3	40.2 ±14.2
Miyata 2012	Standard care	6 mo.	11/11	30.5 ±13.9	36.0 ±11.2	30.2 ±9.0	32.2 ±8.8
Oldenburg 2008	None	6 mo.	29	28.2 ±6.9	35.2 ±10.6	N/A	
Oldenburg 2011	Standard care	~6.5 mo.	56/59	29.9 ±6.1	34.0 ±8.8	27.8 ±7.4	28.1 ±8.7
Owada 2013	Standard care	6 mo.	36/44	37.0 ±15.6	44.7 ±15.6	35.7 ±11.1	38.4 ±13.8
Pepperell 2003	Sub-therapeutic ASV	4 wks	15/11	36.5 ±3.0	38.3 ±3.3	35.7 ±3.9	36.3 ±3.8
Philippe 2006	CPAP	6 mo.	7/6	29 ±9	36.9 ±9*	30 ±9	28 ±N/A*
Randerath 2012	CPAP	1 yr.	26/25	47.4 ±15.9	45.5 ±16.0	43.2 ±16.4	48.1 ±11.9
Suzuki 2014	None	6 mo.	29	37.8 ±16.6	46.6 ±14.3	N/A	
Yoshihisa 2011	Standard care	6 mo.	23/37	38.3 ±18.4	46.4 ±15.4	38.9 ±12.9	41.2 ±14.7
Yoshihisa 2013 EJHF	Standard care	6 mo.	18/18	56.1 ±7.4	61.1 ±9.9	54.0 ±8.2	51.9 ±9.7
Zhang 2006	Oxygen	2 wks	14	30.2 ±4.6	37.2 ±4.1	N/A	33.2 ±5.1

*estimated from graph

Table S3: AHI Data; ASV

Author, Yr	Control Treatment	Duration	n (treatment /control)	Test Treatment		Control Treatment	
				Baseline	After	Baseline	After
Arzt 2008	CPAP	1 night	14	46.4 ±4	4 ±1	46.4 ±4	22 ±4
Arzt 2013	Standard care	12 wks.	11/10	20 ±16	5 ±5	19 ±15	20±15
Bitter 2013	Standard care	12 wks	96/86	25 (25,30)*	~27.5±N/A	26 (24,32)*	~25±N/A
Campbell 2012	Oxygen	8 wks.	7	66.5 ±31.5	5.0 ±6.3	N/A	19.4 ±15.7
Carnevale 2011	Standard care	36 mo.	33	54.0 ±24.0	8 ±2 [†]	N/A	N/A
Cowie 2015	Standard care	31 mo.	666/659	31.2 ±12.7	33(00,365)*	31.7±13.2	N/A
Fietze 2008	BPAP-S/T	6 wks.	15/15	31.0 ±10.0 [‡]	11.1 ±9.9 [‡]	33.4 ±20.5 [‡]	16.1 ±16.2 [‡]
Joho 2012	Standard care	~3.5 mo.	20/12	27 ±14	2 ±3	22 ±7	23 ±3
Kasai 2010	CPAP	3 mo.	15/15	37.4 ±19.5	1.9 ±2.1	38.6 ±13.9	15.4 ±12.8
Kasai 2013	CPAP	3 mo.	12/11	25.0 ±6.9	2.0 ±1.4	23.0 ±7.9	23.1 ±9.1
Kourouklis 2013	None	6 mo.	9	43.2 ±23.2	3.5 ±0.9	N/A	
Koyama 2010	Standard care	4 wks.	10/7	36.6 ±15.8	4.7 ±3.3	33.1 ±16.8	33.9 ±21.7
Koyama 2013	Standard care	6 mo.	10/9	35.7 ±13.7	9.0 ±4.9	39.9 ±8.9	37.2 ±9.7
Miyata 2012	Standard care	6 mo.	11/11	39.0 ±20.7	5.9 ±6.3	33.0 ±17.8	N/A
Morgenthaler 2007	CPAP	1 night	6	46.0 ±22.7	0 ±0	N/A	22.8 ±18.2
	BPAP-S/T	1 night	6	46.0 ±22.7	0 ±0	N/A	1.5 ±1.5
Oldenburg 2008	None	6 mo.	29	37.4 ±9.4	3.8 ±4.1	N/A	
Oldenburg 2011	Standard care	~6.5 mo.	56/59	39.7 ±17.8	6.1 ±12.1	36.6 ±13.2	N/A
Oldenburg 2013	None	3.6 mo.	23	42.8 ±17.5	8.9 ±5.8	N/A	
Owada 2013	Standard care	6 mo.	36/44	36.7 ±15.2	8.3 ±7.6	32.9 ±16.3	28.0 ±14.3
Pepperell 2003	Sub-therapeutic ASV	4 wks.	15/11	24.7 ±11.3	5.4 ±7.4	23.3 ±13.3	14.7 ±10.6
Philippe 2006	CPAP	6 mo.	9/8	47 ±18	3 ±4 [†]	40.5 ±13.5	21 ±25 [†]
Randerath 2012	CPAP	1 yr.	36/34	23.1 ±13.2	6.1 ±7.8	21.8 ±11.7	10.7 ±8.7
Suzuki 2014	None	6 mo.	29	41.0 ±16.8	7.6 ±4.9	N/A	
Szollosi 2006	None	1 night	10/0	30.0 ±20.9	14.0 ±12.0	N/A	
Yoshihisa 2011	Standard care	6 mo.	23/37	38.8 ±17.3	9.0 ±7.9	N/A	N/A
Yoshihisa 2012	Oxygen	1 night	42	39.0 ±17.3	5.0 ±6.3	N/A	22.3 ±13.4
Yoshihisa 2013 EJHF	Standard care	6 mo.	18/18	37.0 ±14.1	6.9 ±6.4	35.4 ±15.5	27.8 ±15.0
Yoshihisa 2013 Heart	None	1 night	50	37.3 ±18.2	9.1 ±13.3	N/A	
Zhang 2006	Oxygen	2 wks	14/14	34.5 ±6.1	6.5 ±0.8	N/A	27.8 ±8.2

* data presented as median (quartiles)

[†] estimated from graph[‡] CSRI = CSAI+PBI (periodic breathing index)**Table S4: Mortality (Cardiac Death) Data; ASV**

Author, Yr	Control Treatment	Duration	Test Treatment		Control Treatment	
			Events	N	Events	N
Cowie 2015	Standard care	31 mo.	165	666	131	659
Owada 2013	Standard care	6 mo.	3	36	11	44
Suzuki 2014	Standard care	6 mo.	1	23	4	37
Yoshihisa 2013 EJHF	Standard care	6 mo.	0	18	3	18