Tracheal intubation in operating room in adult patients at risk for cervical spinal cord injury: a systematic review and meta-analysis of randomized trials.

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Argomento: Neuroanestesia e neurorianimazione

Background Tracheal intubation in patients with known or suspected cervical spine instability is considered at risk for secondary spinal cord injury. We performed a systematic review and metaanalysis of randomized controlled trials (RCTs) comparing techniques to perform tracheal intubation in operating room in adult patients at risk for secondary cervical spinal cord injury.

Methods Through several databases, we identified RCTs: a) comparing different tracheal intubation techniques; b) enrolling adult patients at risk for cervical spine cord injury; c) published in the last 20 years. We excluded studies performed outside the operating room and simulation studies. The primary outcome was first-attempt failure rate; secondary outcomes were time to successful intubation and procedure complications.

Results We identified 16 RCTs enrolling 1874 patients. In three RCTs an "awake" approach was used: fiberoptic bronchoscopy (FOB) was similar than comparators but required more time. No study compared awake versus non-awake techniques. In remaining 13 RCTs, intubation was performed under general anesthesia: first-attempt failure rate was similar when comparing direct laryngoscopy versus other techniques (3 RCTs) and videolaryngoscopy versus other techniques (3 RCTs). Videolaryngoscopy was faster than other techniques. Postoperative neurological complications rate was 0.5% (no significant difference among techniques). No life-threatening adverse event was reported, while mild local complications were common (incidence rate: 20%).

Conclusions No single technique performed significantly better than others in terms of first attempt failure rate and procedural complications.

Figure 1: meta-analysis of awake techniques (intervention: other techniques; control: fiberoptic

bronchoscopy)

A. First-attempt intubation failure rate

	Interver	ntion	Control			Risk Ratio	Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% Cl	M-H, Random, 95% Cl
Jadhav T 2017	5	16	7	16	47.4%	0.71 [0.29, 1.78]	
Mahrous RSS 2017	3	30	0	30	16.3%	7.00 [0.38, 129.93]	_
Saha AK 1998	7	20	2	18	36.3%	3.15 [0.75, 13.25]	
Total (95% CI)		66		64	100.0%	1.78 [0.45, 7.09]	
Total events	15		9				
Heterogeneity: Tau ² =	0.83; Chi ^a	= 4.77	df = 2 (P	= 0.09); I ^z = 589	6	
Test for overall effect:	Z = 0.81 (F	P = 0.42	2)				0.01 0.1 1 10 100 Favours [Intervention] Favours [Control]

B. Time to intubation

	Intervention Control				I		Mean Difference	Mean Difference			
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	IV, Random, 95% CI		
Mahrous RSS 2017	53	7	30	102	11	30	97.6%	-49.00 [-53.67, -44.33]			
Saha AK 1998	19	15	20	81	63	18	2.4%	-62.00 [-91.84, -32.16]	←		
Total (95% CI)			50			48	100.0%	-49.31 [-53.92, -44.70]	•		
Heterogeneity: Tau² = Test for overall effect:	•			-50 -25 0 25 50 Favours [Intervention] Favours [Control]							

Figure 2: meta-analysis of Macintosh (intervention) vs control

A. First-attempt intubation failure rate

	Intervention Control			Risk Ratio	Risk Ratio				
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% Cl	M-H, Random, 95% Cl		
Bharti N 2014	3	19	3	41	40.5%	2.16 [0.48, 9.72]			
Gupta N 2013	3	30	2	90	34.6%	4.50 [0.79, 25.66]			
Xu M 2017	1	135	3	135	24.9%	0.33 [0.04, 3.16]			
Total (95% CI)		184		266	100.0%	1.75 [0.46, 6.71]			
Total events	7		8						
Heterogeneity: Tau ² =	= 0.57; Chi ^a	² = 3.35	, df = 2 (F	P = 0.19	8); I ² = 409	6			
Test for overall effect	Z = 0.81 (P = 0.43	2)				0.01 0.1 1 10 100 Favours [Laryngoscope] Favours [Comparator]		

B. Time to intubation

	Inter	ventio	on	0	Control Mean Difference				Mean Difference		
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI		IV, Random, 95% CI	
Bharti N 2014	30	11	19	35	0.025	41	35.4%	-5.00 [-9.95, -0.05]		-	
Gupta N 2013	34	36	30	38	3.7	90	11.4%	-4.00 [-16.90, 8.90]			
Xu M 2017	25	6	135	24	6	135	53.2%	1.00 [-0.43, 2.43]		•	
Total (95% CI)			184			266	100.0%	-1.69 [-6.57, 3.18]		•	
Heterogeneity: Tau² = Test for overall effect	•			f= 2 (P	-100	-50 0 50 Favours [Laryngoscope] Favours [Comparator]	100				

Figure 3: meta-analysis of videolaryngoscopy (intervention) vs control

A. First-attempt intubation failure rate

	Videolaryngoscope		Compar	rator		Risk Ratio	Risk Ratio			
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% Cl	M-H, Random, 95% Cl			
Fan H 2017	0	15	4	30	16.8%	0.22 [0.01, 3.75]	• • • • • • • • • • • • • • • • • • •			
Gupta N 2013	3	30	0	30	16.2%	7.00 [0.38, 129.93]				
Yumul R 2016	12	70	15	70	67.0%	0.80 [0.40, 1.58]				
Total (95% CI)		115		130	100.0%	0.91 [0.25, 3.39]				
Total events	15		19							
Heterogeneity: Tau ^z = 0.55; Chi ^z = 2.93, df = 2 (P = 0.23); I ^z = 32%										
Test for overall effect	: Z = 0.14 (P = 0	.89)			0.01 0.1 1 10 100 Favours [V-laryngoscope] Favours [Comparator]					

B. Time to intubation

	Videolar	yngoso	:ope	Com	parat	ог		Mean Difference	Mean Difference			
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI		IV, Rando	m, 95% Cl	
Fan H 2017	18	3	15	60	28	30	36.8%	-42.00 [-52.13, -31.87]				
Gupta N 2013	34	36	30	52	36	30	26.1%	-18.00 [-36.22, 0.22]				
Yumul R 2016	35	22	70	59	36	70	37.1%	-24.00 [-33.88, -14.12]				
Total (95% CI)			115			130	100.0%	-29.05 [-43.44, -14.66]		-		
Heterogeneity: Tau ² = 119.91; Chi ² = 8.41, df = 2 (P = 0.01); l ² = 76% Test for overall effect: Z = 3.96 (P < 0.0001)										-50 (<mark>і і</mark> С 50	100
restion overall ellect.	Z = 3.90 (F	~ 0.00	01)						F	Favours [V-laryngoscope]	Favours [Comparator]	