

Diaphragm ultrasound as a predictor of patients at risk of pulmonary postoperative complications after phrenic nerve compromise.



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BACKGROUND

In some patient, procedures (like Interscalene Block (ISB)) that could produce phrenic nerve palsy should be avoided. This procedures can produce postoperative respiratory failure (PRF) if hemidiaphragm palsy occurs.

Diaphragmatic ultrasound applied during weaning in critical care patients has shown that after unilateral phrenic nerve injury, extubation was possible when there was a contralateral healthy hemidiaphragm with at least Diaphragmatic Thickening Fraction (TF)>30% and Diaphragmatic Excursion (DE)>25mm

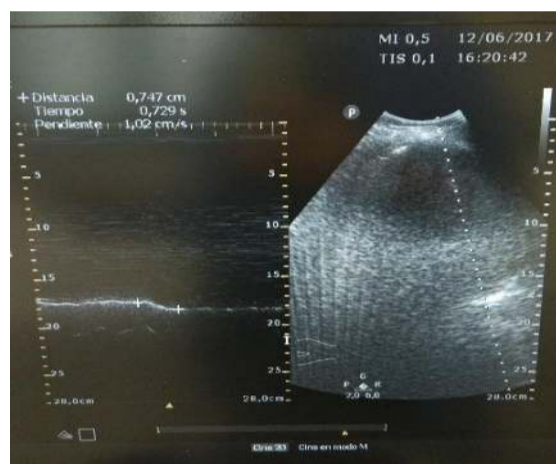
Diaphragm evaluation using TF and DE during the perioperative period (D-POCUS) can be useful in detecting patients at risk of suffering postoperative respiratory failure (PRF) if hemidiaphragm palsy occurs.

METHODS

Case report series (n=6) performing D-POCUS before and after ISB for shoulder surgery. We observe DTF, DE, and signs of PRF at PACU.



Diaphragmatic Thickening Fraction (TF) Measure Diaphragmatic thickness at maximum inspiration and maximum expiration in apposition zone (5-8th intercostal space at anterior axillary line) with 12Mhz linear probe
 $TF = \frac{Ti - Te}{Te} \times 100\%$



Diaphragmatic Excursion (DE) Measure perpendicular diaphragmatic distance (mm) from maximal expiration to maximal inspiration with a convex 3-5 Mhz. probe at subcostal space

RESULTS AND DISCUSSION

PATIENT ID	BEFORE INTERSCALENE BLOCK				AFTER INTERSCALENE BLOCK				POSTOPERATIVE RESPIRATORY FAILURE
	IPSILATERAL HEMIDIAPHRAGM		CONTRALATERAL HEMIDIAPHRAGM		IPSILATERAL HEMIDIAPHRAGM		CONTRALATERAL HEMIDIAPHRAGM		
	TF (%)	DE (mm)	TF (%)	DE (mm)	TF (%)	DE (mm)	TF (%)	DE (mm)	
1	68	35	64	52	4	7	59	46	No
2	219	28	95	16	0	1	28	14	YES
3	35	46	14	46	2	8	16	44	No
4	47	48	59	44	27	--	103	35	No
5	56	73	64	69	7	4	69	43	No
6	30	--	96	55	6	--	47	52	No

ID₂ has Dyspnoea, tachypnoea of 34 rpm, and SaO₂/FiO₂ reduction from 466 to 247 at PACU. Diaphragm evaluation of ID₂ shows DTF=28% DE=14mm.

8 ± 3 minutes lasted the Ultrasound evaluation of the diaphragm.

83% (5/6) has postoperative complete palsy of ipsilateral hemidiaphragm after ISB.

But only 16% (1/6) has PRF.

Patients with ipsilateral hemidiaphragm palsy after ISB were common, this fact didn't produce PRF because contralateral hemidiaphragm is healthy (TF>30% and DE>25mm). the only patient with PRF has TF<30% and DE<25mm.

This cut point is only validated for weaning not for PPC prediction, a new study is granted to validate this test because this evaluation could increase patient safety.

CONCLUSION

When phrenic palsy could be produced, perioperative Point-of-Care Ultrasound measuring TF and DE of contralateral healthy hemidiaphragm seem a fast and simple test to detect and prevent complications.

