

## The Reflection of Plication Surgery for Diaphragm Eventration to Respiratory Function Test

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To the Editor,

Diaphragm plication surgery is conducted to remove dyspnea, which results from mediastinal shift, atelectasia and ventilation/perfusion dyssynchrony in lungs that occur due to an eventrated diaphragm.

A total of 16 cases that underwent diaphragm plication surgery in our clinic due to eventration or paralysis were examined prospectively. Diaphragm eventration values were calculated by means of a new calculation method through PA pulmonary radiographies taken during patient admission and control.

Using PA pulmonary radiography, the distance between the peak of the intact hemidiaphragm and apex point of the ipsilateral hemithorax was measured with this new method. Similarly, the distance between the peak of the eventrated hemidiaphragm and the apex point of ipsilateral hemithorax was measured. The ratio of distances and eventration level were calculated by percentage.

Compared to preoperative values, a decrease was found in FEV1 (lt) values of three cases in the first month, four cases in the sixth month and six cases in the twelfth month of postoperative control. Compared to preoperative values, no change was found in FEV1 (lt) values of two cases in the first month, two cases in the sixth month and one case in the twelfth month of postoperative control. Compared to preoperative values, a decrease was found in FVC (lt) values of three cases in the first month, five cases in the sixth month

and seven cases in the twelfth month of postoperative control. Compared to preoperative values, no change was found in FVC (lt) values of two cases in first month, one case in the sixth month and one case in the twelfth month of postoperative control (Table 1).

With regard to the plication operation in general, the first investigation for the indication of an operation was made by Svanberg in 1956. Since then, it has been argued whether repair of the diaphragm at the lower levels with plication is functional or not (1). Mulvey et al. (2) followed 12 cases for two to four years and no clear change was found in the spirometric measurements of pulmonary volumes. According to research investigating 17 diaphragm plication cases in a wide and long follow-up period, which was reported at the 2006 EACTS/ESTS congress, it was found that the postoperative mean FEV1 value was 71%, which was an increase from 64% in the preoperative period (3). In the present study, an increase was found in RFT values in nine (56.2%) cases compared to the preoperative values. However, considering that the mean increase was 0.09 lt for FEV1 and 0.13 lt for FVC, it is evident that discussions on the indication of diaphragm plication operation are justified.

We believe that more selective decisions should be taken when determining whether patients are appropriate for surgery in unilateral diaphragm eventrations and especially in the adult patient group; plication operations should not be used for low-level diaphragm eventrations which do not result in mediastinal shift.

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**TABLE 1.** Comparing values of preoperative and postoperative respiratory function tests and symptomatology at postoperative twelfth month

Case	Preoperative					Postoperative 1 <sup>st</sup> month					Postoperative 6 <sup>th</sup> month					Postoperative 12 <sup>th</sup> month					Symp.
	FEV <sub>1</sub>		FVC		E	FEV <sub>1</sub>		FVC		E	FEV <sub>1</sub>		FVC		E	FEV <sub>1</sub>		FVC		E	
	lt	%	lt	%	%	lt	%	lt	%	%	lt	%	lt	%	%	lt	%	lt	%	%	
1	1.52	50	2.15	56	23.8	1.64	54	2.36	62	15.3	1.59	53	2.54	66	13.3	1.49	50	2.05	53	16	S
2	1.82	77	2.22	79	37.6	1.66	70	1.80	64	5.7	2.34	96	2.45	85	20	1.91	82	2.20	80	21	S
3	2.95	77	4.17	90	26.9	2.48	65	3.20	69	15.7	2.32	60	3.19	69	15.1	2.55	68	3.46	76	12.5	S
4	1.65	54	2.18	57	36	1.96	65	2.68	70	8.7	2.30	76	3.07	81	11.1	1.95	68	2.69	75	13.2	S
5	1.59	66	2.15	77	34.4	1.44	58	1.68	58	14.9	1.36	57	1.74	62	15	1.11	45	1.48	51	23	B
6	2.46	62	3.15	67	33.5	2.74	68	3.15	67	12.5	2.67	67	3.42	73	7.8	2.43	63	3.07	66	14.3	B
7	1.67	51	2.03	50	20	1.68	52	2.20	54	-10.7	2.45	76	3.21	79	-8.3	2.63	83	3.17	79	-4.3	W
8	2.13	59	2.67	60	31.4	2.58	70	3.07	68	14.7	2.04	55	2.46	54	18.8	2.01	55	2.28	50	18.1	B
9	1.91	59	2.79	68	45.6	2.21	70	3.15	80	0	2.40	94	3.50	117	4.5	2.21	74	3.04	80	13.4	B
10	1.05	64	1.42	71	50	1.16	73	1.42	73	36.9	1.16	71	1.43	72	44.9	1.09	80	1.15	68	33.5	S
11	2.13	66	2.66	67	32.6	2.23	69	2.70	68	13.7	2.17	67	2.56	64	15.1	2.42	79	3.12	83	13.1	B
12	2.13	60	2.52	57	26	2.87	82	3.20	70	-11.1	2.78	79	3.16	73	-16.7	2.45	72	2.77	65	-5.7	W
13	2.12	55	2.28	50	34.6	2.58	68	2.86	63	11.2	2.46	64	2.71	59	12.3	2.30	62	2.65	57	15.2	B
14	1.61	47	2.29	55	18.7	1.89	55	2.52	61	-7.4	1.92	58	2.71	64	-5.3	1.85	56	2.63	63	0	S
15	1.93	62	2.60	67	23.5	1.98	63	2.90	74	5.6	2.24	74	3.58	96	4.9	2.38	77	3.72	94	5.2	B
16	1.31	58	1.44	55	23.5	1.42	63	1.57	59	2.9	1.12	46	1.14	40	1.4	1.21	51	1.35	43	1.9	W
Mean	1.87	60.4	2.42	64.1	31.1	2.03	65.3	2.51	66.2	8.03	2.08	68.3	2.67	72.1	9.6	1.99	66.5	2.55	67.6	11.9	

B: better; E: eventration; S: same; Symp: symptom; W: worse

**Ethics Committee Approval:** Ethics committee approval was received for this study from the ethics committee of Atatürk Training and Research Hospital for Chest Disease and Chest Surgery.

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## REFERENCES

1. Svanberg L. Clinical value of analysis lung function in some intrathoracic diseases: Spirometric, bronchspirometric and angio-pneumographic investigation. *Acta Chir Scand* 1956;111:169-96.
2. Mulvey AD, Aquilina RJ, Elliott MW, Moxham J, Green M. Diaphragmatic dysfunction in neuralgic amyotrophy: an electrophysiologic evaluation of 16 patients presenting with dyspnea. *Am Rev Respir Dis* 1993;147:66-71. [\[CrossRef\]](#)
3. Versteegh MI, Braun J, Voigt PG, Bosman DB, Stolk J, Rabe KF, et al. Diaphragm plication in adult patients with diaphragm paralysis leads to longterm improvement of pulmonary function and level of dyspnea. *Eur J Cardiothorac Surg* 2007;32:449-56. [\[CrossRef\]](#)