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Effect of Phrenicectomy upon the Efficiency of Cough and upon Elimination of Lipiodol from Lungs.

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The removal of a phrenic nerve to paralyze one-half of the diaphragm is now extensively performed in certain cases of pulmonary tuberculosis and in other conditions. Although the literature contains many statements to the effect that cough and expectoration are facilitated by phrenicectomy we have been unable to find any recorded experimental work dealing with such a result. Our experiments show that on the contrary the operation actually interferes with cough and diminishes the elimination from the lung of lipiodol injected into it.

The efficiency of the cough mechanism was measured by the elimination of lipiodol from the lungs before and after phrenicectomy. The rate of disappearance of the oil was determined by means of fluoroscopy and serial roentgen-ray films. Experiments were performed upon 10 dogs. In 2 dogs the time required for the complete disappearance of the oil from the lung was determined. In these 2 dogs a unilateral phrenicectomy was performed after all the oil had disappeared. After they had recovered from their operations the rate of disappearance of lipiodol was again determined and the effect of phrenicectomy upon this rate noted. In 8 dogs unilateral phrenicectomy was performed first and then equal amounts of lipiodol were injected into the right and left lower lobes.

Following the phrenicectomy it was noted under the fluoroscope that some of the oil injected into the lung on the side of the normal diaphragm was coughed up either during the injection or immediately thereafter. Fluoroscopic observations indicated that the

cough mechanism was interfered with on the side of the paralyzed diaphragm.

The difference in the rate of elimination of lipiodol from the lung fields of those dogs which were subjected to preliminary phrenicectomy and injection of lipiodol simultaneously into both lower lobes is recorded in Table I. The tabulated results indicate that either right or left phrenicectomy resulted in a slower disappearance of the oil on the side of the paralyzed diaphragm.

TABLE I.
Effect of Phrenicectomy Upon Elimination of Lipiodol from the Lung.
(Preliminary Phrenicectomy Followed by Injection of Oil)

Amt. Lipiodol Injected Each Lung	Side of Phrenicectomy	Lung from which Oil Disappeared Completely First	No. Days	Retardation of Elimination, Result of Phrenicectomy
cc.				
3	Left	Right	49	Marked
5	Right	Left	63	Definite
2½	Left	Right	88	Slight
3	Right			Not appreciable (63 days)
6	Right	Left	36	Marked
3	Left	Right	36	"
4	Right	Left	14	Definite
3	Left	Right	14	"

In 2 other dogs the oil was injected on the same side both before and after phrenicectomy. In both instances there was retardation of the elimination of oil subsequently to phrenicectomy as compared with that following the original injection.

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Superior Vena Cava Obstruction.

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The effects of superior vena cava obstruction vary according to the degree and location of the obstruction and the suddenness of its development. To determine the tolerance of animals to this condition, to measure the effect on venous pressure and to trace the paths of collateral circulation, experimental obstruction of the superior vena cava was produced in dogs.

The vein was exposed through an intercostal incision and com-