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Meshalkin
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Translated from Russian:

(actually "The First Attempts")

EARLIEST ATTEMPTS AT SURGICAL TREATMENT OF BRONCHIAL ASTMA WITH THE METHOD OF PULMONARY AUTOGRAFTS

By

E.N.Meshalkin et al

(from the Institute of Experimental Biology & Medicine (scientific Director: Prof.E.N.Meshalkin; Director, Docent Iu.I. Borodin) Health Department of USSR, Novosibirsk)

> "... in spite of the great number of failures, in out opinion, still the method of surgical treatment may be permissible, after all others have been exhausted."
>
> Rene Leriche, 1936.

At the present time, the problem of etiology of bronchial asthma has notyet been definitely solved. The majority of authors consider that bronchial asthma"is not a disease sui generis, but rather a syndrome, the origin of which may be conditioned by various etiological factors." (A.L.Polenov). It has been established that many factors may have an effect of the development of bronchial asthma, such factors as allergy, pathological state of the central nervous system, heredity, dysfunction of glands of internal secretions, infection, or some pathological changes in the mucous membrane of the bronchi.

If there still are many "white spots" (probably blank spots)

in the ~~pathology~~ etiology of bronchial asthma, the pathogenesis of the onset of bronchial asthma, on the pther hand, has been relatively well studied. According to the contemporary conception, an attack of expiratory shortness of breath is a result of a reflex action, the efferent routes of which pass through the complex of the vagus nerve, and it is causes by a spasm in the bronchial musculature.

The extent ("level") of information (knowledge) on the etiology and pathogenesis of bronchial asthma may be graphically illustrated by the results of therapy applied to this disease. An attack of bronchial asthma, as a rule, may be successfully stopped with ~~symptomatic~~ sympathomimetic or spasmolytic drugs, whereas complete cure of this disease often appears to be an insurmountable problem. Many of the patients spent the major part of their lives in hospitals, are believed to be incurable and die from complications of bronchial asthma, such as pulmonary emphysema, pneumosclerosis, cor pulmonale. Very rarely death comes from oxygen insufficiency and asthmatic state.

Many types of surgical interventions have been proposed for the patients, incurable by other therapy. However, all these operations cannot guarrantee complete recovery.

In practical surgery, in the treatment of bronchial asthma they use removal of lower cervical and upper thoracic sympathetic nodules, dissection of he trunk of the vagus nerve, ~~combina~~ combination of upper thoracic sympathectomy with

dissection of pulmonary plexus (Abbot), removal of carotid corpuscles (carotid bodies) (Nokayama) resection of pathologically altered portionsof the lungs associated with degeneration (Overholt); D. Dimitrov-Sokodi).

Stable (lasting) disappearance of bronchial asthma attacks after sympathectomy combined with vagotomy was observed by Gebel on 14 out of 46 operated patients. Leriche observed cure in 25% on 19 patients, following sympathectomy, relative improvement in 25%, and no change in 50% of patients. Windhopf, and Hay, performed bilateral resection of the posterior pulmonary plexus and noted that of the 10 persons operated on 4 recovered and returned to work, 4 had marked improvement, and on 2 surgery brought about no result. D. Dimitrov-Sokodi, summing up the results of 9years of surgical treatment of bronchial asthma, noted good results in 70% observations out of 192 operated on patients.

In this manner, all the proposed surgical interventions for bronchial asthma are focused in denervation of the lungs. However, denervation after such operations is partial and cannot completely break the arc of pathological reflex. Apparently, this can only be achieved with the method of lung autografts.

In experiments on dogs, we obtained convincing data

* Results of these experiments have been reported at the XV scientific session of the A.V.Vishnevskii Surgical Institute and at the conference of

(next page)

showing that unilateral and bilateral autografts of lungs are technically feasible, do not essentially reflect on vital activities of the organism, and involve no marked physiological or morphological changes in the transplanted lung. Similar data have been obtained by other authors with reference to unilateral autografts of lungs (Portin et al; Jeh et al; Alican et al; S.Iu Iutanov).

Administration of threshold doses of proserin (or prozerin?) which causes reflex bronchial spasm, the latter was only obtained in the intact lung, whereas in the autografted lung there was increased ventilation and greater consumption of oxygen which we evaluated as a compensatory reaction.

Positive experiments lresults served as a foundation for testing this operation in the clinic, with lung autografts, as a method of surgical treatment of bronchial asthma in the cases, when other prolonged therapeutical measures, as well as various surgical interventions, proved to be ineffectove.

By the present time, we have performed 7 lung autografts** for bronchial asthma (E.N.Meshalkin). Below are some brief excerpts from clinical histories,

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(cont. from p.3): new and rationalized medicine at Novo-Sibirsk 12-18-63.

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The technique of this operation is described in an article by Prof.E.N.Meshalkin "Surgical technique of lung autograft" in the proceedings of scientific works of the Institute of Experimental Biology & Medicine, Novosibirsk, 1964.

Patient K, 12years old male, hospitalized 6-24-63. Complaints of frequent attacks of choking, occurring up to 10 times a day, and accompanied with difficult expiration. These attacks appeared since age of 2 years. During 10 years, practically all the time was in hospital for treatment, life at home was impossible. They used desensitizing and hormone therapy, needle punctures; changed residence and climate. It was possible to arrest attacks with great difficulty by aministering adrenalin or diaphyllin (spelling?).

On physical examination, general condition, outside of attack, is moderately severe. Over the lungs there is a percussion bandbox sound; at auscultation, breathing is vesicular, there are some scattered dry rales. Roentgen examination: lung fields show increased transparency, roots are intensified. Heart not enlarged in size, in oblique positions there protrudes the conus of pulmonary artery. On bronchoscopical examination, there was noted pallor of the mucous membrane and pronounced (marked) folds at the bronchial ostia, irregular narrowing of the peripheral bronchi. Pneumotachogram: speed of air movement 0.15 1/sec., equal at inspiration and expiration; resistance of bronchial passaged 70 mm of water column 1/sec. No deviations from normal in other inner organs. Diagnosis: Bronchial asthma.

On July 23, performed radical resection of nerve plexus in left lung with the method of autograft. By the 8th day, the lung filled out and coccupied the entire pleural cavity. The wound healed with primary intention. During the post-

operative period, there was noted marked narrowing of the lumen in the main left bronchus, caused by edema in the region of anastomosis. Therapeutic bronchoscopies were then done with cleaning out of the bronchial tree and application of 1% adrenalin solution on the inner surface of the bronchial suture. By the 10th day manifestations of stenosis abated. Roentgen showed the left lung to have no signs of hypoventilation. During the 24 days of observation, there were seen 3 short-lasting slight attacks of expiration edema which disappeared spontaneously. On the 25th postoperative day the patient died with symptoms of profuse hemorrhage from the tracheobronchial tree.

Section (autopsy) showed a fistula between the pulmonary artery and the main bronchus on the left 0.3 cm. distal from the anastomosis. The alveolar lumens were filled with formed elements of blood. There was present hypertrophy of smooth muscle bundles and lymphoid infiltration in the walls of the bonrhioles.

We believe that this complication occurred as a consequence of bronchial trauma during bronchoscopy with subsequence infection of the wound. We have no reason to assume that the fistula was caused by the disturbance of the neurotrophic regulation of the lung. Such a complication we have not observed once in 94 cases of autografts of lungs, done experimentally, nor has it been described by other authors (Fig.1)

Case history

Female Patient P, 26 years of age, hospitalized on 1-2-64 with complaints of constant state of choking (dyspnea), due to difficult expiration, and cough with elimination of viscous sputum. The first attacks of expiration dyspnea appeared in 1949. At first these were repeated 7 to 10 times a day, then became more frequent, up to 17 times daily. Earlier attacks could be stopped with administration of adrenalin, atropine, diaphilline, taking of antastaman or narcosis with fluothan (spelling?). These drugs only gave short lasting relief. In 1961 removal of carotid bodies was done bilaterally. No improvement was noted. The patient is constantly treated at the hospital. Her cpndition on admission was poor. Her attitude is forced. She sits, resting her hands on the edge of the bed. Her face is pale, swollen. The mucous membranes of thelips have a cyanotic tinge to them. Whistling rales are heard at a distance. The thorax is shapped like a barrel, the percussion sounds are babdbox type. At auscultation, breathing is weak, vesicular, there are numerous dry rhonchi on both sides. Roentgen examination: transparency of lung fields is heightened, the intercostal spaces are widened; the heart is not enlarged transversely, on the left contour there is protrusion of the pulmonary artery arc. Sputum analysis: leukocytes throughout the entire visual field, eosinophils in large numbers, single Charcot-Leyden crystals here and there. The general spirogram showed

increased lung ventilation and increased consumption of oxygen without disturbance in their correlation.

Fig. 1. Curve of pressure in the pulmoanry artery (LA), atrium pulmonary vein (LV), left preeerdium (LP) and left ventricle (LZh) of patient K, before and after autograft of the lunf lung.

Before the operation

after the operation

Minute volume of respiration (MOD) 11 1/min (240% of the required MOD-DMOD), oxygen consumtpion (PO_2) 396 ml/min (210% of the required PO_2-DPO_2), oxygen consumption coefficient (KIK) 36, vital capacity of the lungs (ZhEL) 726 ml (26% of required ZhEL - DZhEL). Stange's test 5 sec., Soobraze test 3 sec.

The pneumotachogram showed marked increase in the brpnchial resistance, upt o 400 mm of water column 1/sec. No deviations from the normal in any other internal organs. Diagnosis: Bronchial asthma, asthmatic state. On 1-14-64 radical resection of nerve plexus of the left lungs was done with the method of autograft. By the 6th day, the lung filled out and occupied the entire pleural cavity. The wound healed by ½rimary intention. The edema in the bronchial anastomosis was not marked. On the 10th day the left lung shows no signs of hyperventilation. During 12 days the patient had no attacks of expiration dyspnea. Then

they reappeared again, but were less intensive and of shorter duration that before the operation. Thrombosis of the left pulmonary artery was suspected, and an angiopulmonogram was done for this. With a hand syringe 55 ml of 85% of "gipak" (not in any available dictionaries). In the erect position film was taken with the speed of 48 "cadres" (frame?) per second. There was observed tight filling of the right atrium, right ventricle and of the lung trunk. From the latter, most of the contrast medium passed into the right pulmonary artery and only with a delay of 4 cardocycles in a very small amount - into the left pulmonary artery. The presence of partial thrombosis of the left pulmonary artery was confirmed with divided bronchospirogram: in the left lung there is considerably decreased oxygen consumption with preserved ventilation. On 3-2-64 denervation of the right lung was done by means of resection of the posterior lumpnary plexus and skeletonization of the vascular elements in the region of the root. After the second operation attacks of expiration dyspnea have been observed much more rarely (2-3 times a day), they are less intensive and shorter.

Biopsy of the lung (during surgery): the alveolar partitions are thin. There is excessive dilation and thickening of the alveoles and bronchioles. The walls of the latter is lined with cylinder epithelium, their walls show hypertrophy of smooth muscle bundles and thick (dense) infiltration

infiltration of lymphoid elements. General spirogram on 5-10-64: MOD 3.5 1/min. (76% DMOD). PO_2 144 ml/min. (77% DPO_2), (KIK) 41 ZhEL 880 ml (29% DZHELO, minute lung ventilation (MLV) 17.6 (34% of the required MLV-DMLV). Stange test 15 sec., Soobraze test 12 sec. The patient was discharged in good condition.

Male patient T., 7 years olf, hospitalized 2-20-64. Complaints of frequent attacks of dyspnea with difficult expiration. Attacks first appeared in 1962. Occur daily. They may be stopped with administration of adrenalin, atropine, diaphyllin or by taking theophedrine. Has been treated in hospitals for a year. His condition continually worsens gradually. On admission, general condition relatively satisfactory. Over the lung fields, percussion sound with bandbox nuances, breathing is vesicular. Roentgen: intensified transparency of lung fields, pulmonary markings ("pattern") is intensified and demormed in the lower portions on the right; the diaphragm domes are mobile; the heart is not enlarged in transverse diameter, on the left contour there is projection of the arch of the pulmonary artery. Pneumotachogram shows marked increase in the resistance of the bronchi (up to 328 mm of water column 1/sec.)m intra-alveolar pressure 26 mm of water column. In the other innder organs no deviations from the normal are found. Diagnosis: Bronchial asthma.

On 3-12-64 radical resection of the nerve plexus in the

right plexus was done with the autograft method. The postoperative period was unev entful. On 3-18-64 at Roentgenoscopy pnsumatization of the right lung is somewhat lowered. No fluid in the pleural cavity. Twelve (12) days after the operatuon control pnsumotachogram showed increased speed of the air movement from 0.1 to 0.18 1/sec., intra-alveolar pressure as compared to that before surgery increased by 37%, bronchial resistance remained unchanged.

Lung biopsy: lung tissue is airy; alveolar partitions are thickened here and there at the expense of proliferation of the septal cells. There is diffuse thickening of the walls of the bronchioles due to hypertrophy of the smooth muscle bundles, dense round cell infiltrate and metaplasia of the bronchial epithelium. No attacks since the operation. The patient was discharged in good condition.

Female patient I, 17 years old, hospitalized on 2-20-64 with complaints of frequent attacks of dyspnea with difficult expiration. Attacks first appeared in 1962. They occur daily this past year. They may be arrested with administration of theophedrine, adrenalin or atrophine. Has been frequently treated at sanatoriums and hospital. Has been given prednizolon, iontrophoresis with adrenaline, general irradiation with quartz. No effect noted. Her general condition is satisfactory. Percussion sound over the lungs is bandbox type, breathing is vesicular. Roentgen showed the lung fields to be of usual transparency. The heart not

enlarged in transverse diameter, in oblique positions the conus of pulmonary artery projects. On bronchogram, the bronchi of the lower lobe of the left lung are somewhat widened and deformed, there is a slight narrowing (possibly, spasm) of the initial portions of the segmented bronchi in both lungs. Spirogram of 2-27 showed MOD 5.6 (112% DMOD), PO_2 144 ml/min. (72% DPO_2), KIK 25.7 ZhEL 1500 ml (50% DZhEL), MLV 32.9 l/min (DMLV 47%). Stange test 26 sec., Soobraze test 12 sec. Pneumotachogram showed increased resistance in the bronchi up to 108 mm of water column l/sec. No changes found in any other organs.

Diagnosis: Bronchial asthma. On 3-13 operation was done: radical resection of nerve plexus of the left lung with the method of autograft. Operation was uneventful. During the 1st postoperative period with indications there were done punctures of the left pleural cavity with aspiration of serous hemorrhagiv fluid in moderate amounts (200-100 mm). On the 3rd day after surgery there appeared subcutaneous emphysema on the anterior and lateral surface of the left half of the thorax which was believed to be a result of injury to the lung during the puncture. Subcutaneous emphysema subsequently disappeared spontaneously. Temperature became normal since the 6th day after the operation. On 3-20, Roentgen showed the left lung to open up fully, on the left the lung fields show somewhat decreased transparency, sinuses are free, the diaphragm is mobile. No attacks of expiration dyspnea.

On March 27, patient's temperature went up t o 38°C, she complained of not feeling well, and having pains in the left half of the thorax.

On 3-29 there was sudden profuse pulmonary hemorrhage. Arterial pressure dropped down to 0. An emergency ~~retheratemy~~. rethoracotomy. There was about 30 ml. of seropurulent fluid in the pleural cavity. A considerable amount of infiltrate was found in the region of the anastomosis of the pulmonary artery and bronchus. The pulmonary artery was ligated above the infiltrate. Measures were initiated for the resuscitation of cardiac activity (or function). However, to no avail. The patient died.

Pathologoanatomical ~~analysis~~ diagnosis: Bronchial asthma chronic [redacted] deforming bronchitis with appearance of retention bronchoectases; eosinophilic infiltrate in the left lung. Cpndition after autograft of the left lung: foci of purulent pneumonia of the lower lobe of the left lung; fibrinopurulent pleuritis; suppuration of the wall of the left main bronchus and peribronchial cellular tissue; insolvency of the suture of the main bronchus; bronchial fistula; profuse pulmonary hemorrhage; filling up with b ood of the right bronchial tree; anemia of the inner organs; hematogastrium; hepatic shock.

The cause for the appearance of bronchovasal fistula may be sought in the suppuration in the region of the suture and its incompetence. Already the study of the emergency biopsy of the uvular segment showed marked changes in the lung

tissue of the type of eosinophilic pneumonia (Leffler infiltrate), as well as peculiar involvement of the blood vessels of the bronchial artery system which was manifested in a picture of allergical periartheritis and thrombangiitis. We believe it possible to assume that the latter (condition) played a certain role (or part) also in the worsening of the bronchial wall, as well as in the peculiar course of the inflammatory process in it. In this manner, in case of the appearance of obvious signs ofaggravation of the allergic process in the form of sudden increase in eosinophilia, ROE (sedimentation rate of erythrocytes), etc. and marked changes in the lungs (bronchoectases, pneumonia, etc.) it is better to refrain from surgical intervention.

Male patient Ch., 24 years, hospitalized 2-20-64 with complaints of attacks of dyspnea with difficult expiration. Attacks atarted since age of 6years. Since 1958 such attacks occur daily 3 to 4 times. They may be stopped with administration of adrenaline, and diaphylline. The patient has been for a long time treated without results in therapeutical divisions.

His general condition on admission is satisfactory. The percussion sound over the lungs i bandbox type, breathing is vesicular, there are abundant dry rales on both sides. Roentgen of the thorax: intensified transparency of lung fields, changing little with inspiration and expiration. The roots are strand-like. At br nchoscopy there was found atrophy

of the mucous membrane of the main and lobar bronchi. No disturbances in terminal blood circulation on the end angiopulmonogram. Pneumotachogram: increased resistance of the bronchi up to 292 mm of water column 1/sec. Maximum speed of forced expiration 2.4 1/sec. Intra-alveolar pressure: 41 mm of water column. No changes found in other inner organs. Diagnosis: bronchial asthma.

Denervation of the left lung was done on 3-14-64 with the method of autograft. The operation and the post operative period not remarkable. The lung filled out. No fluid in the pleural cavity, During the postoperative period there were observed some attackd of expiration dyspnea which were less intensive and could be quickly stopped with internal administration of diaphylline, but had a tendency to become more frequent; in connection with this on 6-23-64 there was done radical resection of nerve plxus of the right lung with the method of autograft. The patient's condition at the present time is satisfactory. He resumed his activities, there are no attacks of expiration dyspnea (Fig. 2).

Fig. 2. Photograph of patient Ch. 24 days after two-stage bilateral autografts of the lungs.

Female patient K., 18 years of age, hospitalized 3-12-64 with complaints of frequent paroxysms of dyspnea (choking) with difficult expiration. These attacks first appeared

at the age of 8 yrs.,they occur daily 3 to 4 times. She has been treated for a long time without result in therapeutical divisions. In December 1963 autograft of left lung was to be done, however, in connection with lung edema after thoracotomy, surgery was limiyed to resection of the posterior bronchial plxus and skelitizing of the blood vessel components at the root of the lung.

General condition is relatively satisfactory. The thorax is cylindrical in shape, symmetrical. The postoperative scar is thin, mobile. Percussion sound over left lung is bandbox type. At auscultation, breathing is vesiculr, on the right isolated dry rales. Roentgen examination: lung fields show intensified transparency which does not varyt sufficiently on inspiration; the pulmonary pattern is evenly stressed on both sides; on the right the interlobar "anchors" (adhesions) along the main and accessory interlobar spaces; the dome of the diaphragm is limited in mobility; the sinuses are free, the heart is of the hanging type, there is no enlargments of its divisions. At bronchoscopy, the mucous membrane of the bronchi is pale, the crests ("comba") at the site of division of the bronchi are sharp, in the bronchial lumens on either side there is a moderate amount of mucous membrane viscous sputum. The kinobronchogram shows narrowing of the distal segments of the bronchial tree, uniform on both sides. No pathological changes seen in the vessels on the kinoangiopulmonogram. General spirogram: MOD 7.4 1 (120%

DMOD), PO_2 108 ml/min. (60% SPO_2), KIK 14,5 ZhEL 2500 ml. (80% DZhEL), MLV 18.9 1/min. (42%1" DMLV). Stange test 21 sec., Sobraze test 15 sec. at pneumotachogram intra-alveolar pressure 51 mm. of the water column, bronchial resistance 146 mm. of water column 1/sec., speed of forced exit 1.2 1/sec. No changes in other inner organs.

Diagnosis: Bronchial asthma.. On May25 surgery was done: radical resection of nerve plexus of the right lung with the method of autograft. The postoperative period was uneventful. No attacks of expiration dyspane. Discharged in good condition.

Female patient Sh., 27 years of age, hospitalized on 5-4--64 with complaints of frequent paroxysms of dyspnea with difficult expiration. Attacks exist since 1956. She has been treated many times at hospitals. Desensibilization therapy, needle punctures, novocaine block of the nerve plexus, change of residence and change of climate - all to no avail. Attacks of choking accur 6-10 times a day, are arrested with difficulty with administration of adrenaline or atropine.

The patient's general condition, outside of an attack, is relatively satisfactory. The thorax is cylindrical in shape, symmetrical. Over the lung percussion sound is of bandbox type. Breathing is vesicular, there are isolated dry rales. Roentgen examination: lung fields show increased transparency which changes little with inspiration and expiration;

intensified pulmonary pattern in the lower portions, mostly on the right; the diaphragm is movable, sinuses are free; cardiac borders within normal limits. Bronchoscopy: mucous membrane of the bronchi is pale, their lumens are well patent. Biopsy of the bronchial wall: hyperplastic bronchial epithelium on thickened hyalinized membrane with great numbers of goblet shaped cells.

Bronchogram showed incompatibility of diameter of segmented and subsegmented bronchi at the expense of the spasm (?) of the latter. The terminal angiopulmonogram: the angle of in-branching (insertion) of the intralobular arteries is somewhant enlarged; the capillaries are filled evenly; the arterial and venous branchings are well demarcated; unusually long are seen pulmonary veins after the disappearance of contrast medium from the pulmonary aateries (4 sec.). General spirogram: MOD 4.9 1/min (108% DMOD, PO_2 180 ml/min. (93% $DPO_2)_2$, ZHEL 3000 ml^3 (107% DZhEL), MLV 34.8 1/min. (71% DMLV). STange test 26 sec., Soobraze test 11 sec. Pneumotachogram: speed of forced expiration is lowered, bronchial resistance 150 mm of water column 1/sec.

No changes in other organs. Diagnosis: bronchial asthma. On 6-8 radical resection was done of the nerve plxus in the left lung using the method of autograft.

Lung biopsy during the operation: thinning of the

alveolar partitions and thickening of the alveoli. In the smaller and medium s-zed bronchi the appearance of chronic deforming bronchitis. In the corresponding branches of the pulmonary artery some thickening of the muscle layer, thickening and hyperplasia of muscle elelments in the walls of pulmonary veins. Postoperative period was uneventful. No paroxysms of dyspnea. Discharged on July 11 in good condition.

Patients	Before lung autograft				After lung autograft			
	pulmonary artery		pulmmnary vein		pulmonary artery		pulmonary vein	
	pressure in mm	degree of saturation of blood with oxygen in %	pressure in mm	degree of oxggen saturadion of blood in %	pressure in mm	degree of oxygen saturation of blood in %	pressure	oxygen satur. etc.
K.								
P.								
T.								
I.								
Ch.								
K.								

table is not retyped, see the Russian text, p. 32

All patients were indicated to have antibiotics during the postoperative period until temperature was stabilized normal. Punctures of pleural cavity and therapeutic bronchoscopy were done when indicated. The patients T.,I and Ch. received anticoagulants during3 weeks after surgery. The prothrombine index was maintained at the level or 40%.

Control on the functional state of the lung with autograft was done by means of measur measuring pressure in the pulmonary artery and pulmonary vein and determination of the degree of blood saturation with oxygan before the

autograft and immediately after it.

The results obtained are presented in the Table (above).

As one can seen from the Table, in all of the cases, immediately after autograft there were no essential changes in the hemodynamics of the lungs and their function of oxygenator in the blood was not diminished.

During the postoperative period, patients K and I. had suppuration of the bronchial anastomosis with appearance of bronchial fistula. Death in both cases was caused by profuse lung hemorrhage. In patient K. in the postoperative period there was partial thrombosis of the blood vessels in the lung autograft. The respiratory function of this lung was markedly diminished, and there reappeared severe paroxysms of bronchial asthma. This patient received no anticoagulants in the postoperative period. The rest of the patients were indicated to have anticoagulants for prophylaxis of thrombosis.

We believe that the complications which have arisen are associated not with the denervation of the lung per se, but rather with some errors in course of postoperative period. With further perfectioning of the method such complications should not arise.

The first in the world attempts to treat bronchial asthma by means of denervation of the lung with autografts have shown that this operation is quite feasible in practical surgery and may be used with strict ~~indca~~ indications, when all other methods have been exhausted. Its therapeutical

effectiveness have been demonstrated. All patients that have had such operation, even with unilateral autograft of lung, have had marked relief. In 2 patients, there were no more attacks after the operation, and in all others attacks were much more infrequeny and mild.

It may be assumed that following bilateral autograft of lungs, at acks of bronchial asthma should not recur, inasmuch as the conduction paths (afferent routes) pf the pathological reflex, which causes bronchial spas,,will be competely interrupted.

Note from the E ditors: One cannot always foretell the eventual fate of a new method. The editors are publishing this article, leaving the question open, as to whether one is justified to trwat bronchial asthma with unilateral or bilaternal reimplants of the lungs.

If the basic principle of this operation is the interruption of the pathological reflex - a particular form of denervation - then one could perhaps conceive some less risky method of accomplishing it.

Literature is not transcribed

There is an English Summary in the text. p. 33

-twb
Requested: Sept. 26
11-4-66

For Helen C.McGurk, Med. Librarian, US Naval Hospital Philadelphia

Translated by Tatiana Boldyreff