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SPECIAL FEATURES OF SURGICAL INTERVENTION UNDER
CONDITIONS OF WEIGHTLESSNESS(U) FOREIGN TECHNOLOGY DIV
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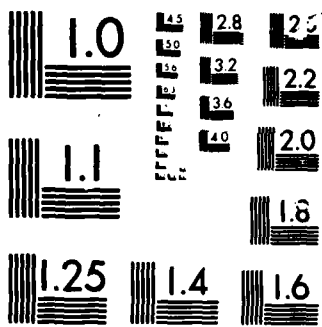
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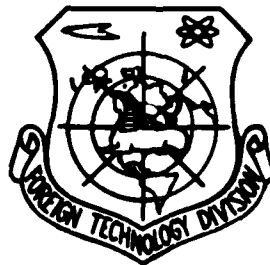
FOREIGN TECHNOLOGY DIVISION



SPECIAL FEATURES OF SURGICAL INTERVENTION UNDER CONDITIONS OF WEIGHTLESSNESS

by

G.L. Yaroshenko, V.G. Terent'yev, M.N. Mokrov



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SPECIAL FEATURES OF SURGICAL INTERVENTION UNDER CONDITIONS OF WEIGHTLESSNESS

By: G. L. Yaroshenko, V.G. Terent'yev, M.N. Mokrov

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We need three things: the incorrect or poor translation, the correct or improved word or phrase, and the foreign page number.

Example:

Translation # FTD-ID(RS)T-0204-86 (Provided by SIT)

Foreign Page # _____

Incorrect word/phrase: _____

Recommendation: _____

Foreign page numbers occur in the English text and may be found anywhere along the left margin of the page as in this example:

In them occurs the state named "night blindness" - hemeralopia, which, according to the current point of view, is a result of damage of the rod-shaped apparatus of the eye.

Page 51.

However, in recent years it has been shown that with the hereditary pigment degenerations in animals the biochemical changes are observed in all cellular elements of the retina.

Remove the sheet with your recommendations from the translation and forward it to:

SITR/Mr Koolbeck/76538

The dictionary modification process requires from six weeks to six months to accomplish; therefore it will be some time before the results of your recommendations will be evident in translations.

We thank you for your assistance in improving the machine translation product.

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Foreign Page # _____

Incorrect word/phrase: _____

Recommendation: _____

U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<i>А а</i>	A, a	Р р	<i>Р р</i>	R, r
Б б	<i>Б б</i>	B, b	С с	<i>С с</i>	S, s
В в	<i>В в</i>	V, v	Т т	<i>Т т</i>	T, t
Г г	<i>Г г</i>	G, g	У у	<i>У у</i>	U, u
Д д	<i>Д д</i>	D, d	Ф ф	<i>Ф ф</i>	F, f
Е е	<i>Е е</i>	Ye, ye; E, e*	Х х	<i>Х х</i>	Kh, kh
Ж ж	<i>Ж ж</i>	Zh, zh	Ц ц	<i>Ц ц</i>	Ts, ts
З з	<i>З з</i>	Z, z	Ч ч	<i>Ч ч</i>	Ch, ch
И и	<i>И и</i>	I, i	Ш ш	<i>Ш ш</i>	Sh, sh
Й й	<i>Й й</i>	Y, y	Щ щ	<i>Щ щ</i>	Shch, shch
К к	<i>К к</i>	K, k	Ъ ъ	<i>Ъ ъ</i>	"
Л л	<i>Л л</i>	L, l	Ы ы	<i>Ы ы</i>	Y, y
М м	<i>М м</i>	M, m	Ь ь	<i>Ь ь</i>	'
Н н	<i>Н н</i>	N, n	Э э	<i>Э э</i>	E, e
О о	<i>О о</i>	O, o	Ю ю	<i>Ю ю</i>	Yu, yu
П п	<i>П п</i>	P, p	Я я	<i>Я я</i>	Ya, ya

*ye initially, after vowels, and after ь, ь; e elsewhere.
When written as ë in Russian, transliterate as yë or ë.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	sinh ⁻¹
cos	cos	ch	cosh	arc ch	cosh ⁻¹
tg	tan	th	tanh	arc th	tanh ⁻¹
ctg	cot	cth	coth	arc cth	coth ⁻¹
sec	sec	sch	sech	arc sch	sech ⁻¹
cosec	csc	csch	csch	arc csch	csch ⁻¹

Russian English

rot curl
lg log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

Page 69.

Special features of surgical intervention under conditions of weightlessness ¹.

FOOTNOTE ¹ In the work took part doctors I. A. Kolosov, I. F. Chikirda, projectionist V. V. Tereshkov. ENDFOOTNOTE.

Lieutenant Colonel of the medical service G. L. Yaroshenko, Colonel of medical service candidate of medical sciences V. G. Terent'yev, Lieutenant Colonel of medical service M. N. Mokrov.

At present questions of medical support of prolonged space flights acquire fundamental importance. Among these questions together with forecasting of the probable morbidity of cosmonauts urgent/actual is the determination of the possibility of executing of medical manipulations, including surgical intervention under the conditions of weightlessness. In particular, it is necessary to explain, will during the sections/cuts the blood and other biological fluids/liquids sputter on the cab as water, or by virtue of their physical properties (larger viscosity and surface tension) they will remain on the tissues in the region of wound and will not soil the atmosphere of cab; expediently whether the introduction of the anesthetizing solutions/openings along the branch cut (this raises

the hydration of tissues), or in order to shield the atmosphere of cab, should be applied other forms/species of anesthetization - noninhalation anesthesia, conduction anesthesia and the like; will change the intensity of eventration of intestine with the laparotomy/ceiotomy in connection with absence of gravitation and high-altitude meteorism, the need of limiting the value of sections/cuts will arise; are such the special features/peculiarities of injections and intravenous infusions of the medicinal solutions/openings in the conditions of weightlessness, etc.

In literature available to us we did not meet communications/reports about surgical interventions in zero gravity state. Without having a response/answer to these questions, it is not possible to establish/install the optimum set of medical substances in the spacecraft, it is not possible to give correct recommendations regarding rendering aid in the critical states. For the purpose of the study of some of the presented questions in the special transparent/hyaline container on the rabbits were carried out surgical operations/procedures - laparotomy/ceiotomy, under the local anesthesia. Surgeon G. L. Yaroshenko was fixed to the armchair with special belts. Operating time in the null gravity state was approximately 10 minutes. Health and efficiency of experimenter were normal. As a result of the carried out operations/procedures it is established that the autopsy of ampules and the filling of syringe

with liquid contents (20% solution of caffeine-benzoate of sodium) does not present difficulties. Fluid/liquid does not escape from the ampule even with the low breaking (wide autopsy) of ampule. The change of the configuration of fluid/liquid in the ampule, characteristic for the wetting fluids/liquids in the weightlessness (lift on the walls with the attenuation in the center), does not interfere with the filling of syringe. Upon the entry/incidence into the syringe of air together with the medicinal substances (0.5% solution of novocaine) in the syringe are formed the large/coarse bubbles, which are located within the fluid/liquid. Via the agitation of syringe bubbles can be moved in the direction of needle, but their removal from the syringe with the put on needle is difficult and it is connected with the loss of medicinal solution. When in the fluid/liquid there are no bubbles of air, the process of the introduction of medicinal solution does not cause difficulties. It is noted, that an increase in the hydration of tissues via local anesthesia along the branch cut does not cause the contamination of the atmosphere of cab. Since with the autopsy of abdominal cavity is observed more expressed eventration of intestine, the need for putting to use retractor did not appear.

After the autopsy of the large intestine its content remains on the edges of section/cut and, being gradually secreted to the surface of the serous membrane of intestine, it is not separated/liberated

from it and it does not soil the atmosphere. During the dissection of the wall of the small intestine also is not noted the contamination of the atmosphere. In both cases the release of intestinal contents from the place of the section/cut of intestine was not conducted.

Page 70.

Dissection of mesentery of small intestine was accompanied by mixed hemorrhage. The blood did not spout, but hemorrhage was considerable, was poured mesentery. Under these conditions the blood did not spatter in the atmosphere, but it spread around the damaged vessels in the form of puddle. With the arterial hemorrhage the fountain of the blood spatter in the form of drops and it resounded to the different sides.

Under conditions of short-time dynamic weightlessness to set change in hygroscopicity level of surgical dressing (gauze) was impossible. Metallic surgical instruments are held well by magnet, fastened/strengthened under the metallic plane of operating stand. Furthermore, instrumentation and syringes "Record" can be fastened on the gauze strips/films or on the operating linen (terminals in the enclosed state, scalpels and forceps must be inserted into the gauze).

Carried out work makes it possible to make following conclusions:

1. Execution of surgical intervention under conditions of weightlessness is possible and is not connected with great difficulties.

2. Should be considered probability of pulverizing/atomizing biological fluids, which are located under relatively greater pressure (for example, arterial blood). For preventing the pollution/contamination of the atmosphere of cabin during the dissection of the tissues, rich in vessels, is desirable the preliminary imposition of hemostatic forceps. With the moderate hemorrhage, when the blood does not spout, the contamination of the atmosphere of cabin does not occur.

3. Local anesthesia in null gravity state is shown, and is method of selection.

4. With autopsy of peritoneum strengthening of eventration of intestine is observed. Therefore the autopsy of peritoneum should be conducted step by step, minimally limiting the length of section/cut.

5. With autopsy of lumen of thick and small intestine contamination of atmosphere of cabin does not occur (odor in form/species there is not).

6. With filling of syringe with medicinal solutions, intended for intravenous introduction, one should thoroughly track so that

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together with solution air would not fall.

END

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