

N O T I C E

THIS DOCUMENT HAS BEEN REPRODUCED FROM
MICROFICHE. ALTHOUGH IT IS RECOGNIZED THAT
CERTAIN PORTIONS ARE ILLEGIBLE, IT IS BEING RELEASED
IN THE INTEREST OF MAKING AVAILABLE AS MUCH
INFORMATION AS POSSIBLE

THE USE OF ANTIGRAVITY SUITS IN THE TREATMENT OF IDIOPATHIC ORTHOSTATIC HYPOTENSION

K. Landmark
S. Kravik

(NASA-TM-75804) THE USE OF ANTIGRAVITY SUITS IN THE TREATMENT OF IDIOPATHIC ORTHOSTATIC HYPOTENSION (National Aeronautics and Space Administration) 8 p
HC A02/MF A01

N80-27077

Unclas
27942

CSCL 06E G3/52

Translation of "Bruk av anti-G-drakt i behandlingen av idiopatisk ortostatisk hypotensjon", Tidsskrift for den Norske Laegeforening (Norway) Volume 99, Nr. 30, pp 1530-1531, 1979



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546, April, 1980

STANDARD TITLE PAGE

1. Report No. NASA TM-75804	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle THE USE OF ANTIGRAVITY SUITS IN THE TREATMENT OF IDIOPATHIC ORTHOSTATIC HYPOTENSION		5. Report Date April, 1980	6. Performing Organization Code
		8. Performing Organization Report No.	10. Work Unit No.
7. Author(s) K. Landmark and S. Kravik, Medical Department B, Royal Hospital, Oslo, Norway		11. Contract or Grant No. NASw-3199	13. Type of Report and Period Covered Translation
		12. Sponsoring Agency Name and Address National Aeronautics and Space Administration, Washington D.C. 20546	
9. Performing Organization Name and Address Leo Kanner Associates Redwood City, California 94063		14. Sponsoring Agency Code	
15. Supplementary Notes Translation of "B.luk av anti-G-drakt i behandlingen av idiopatisk ortostatisk hypotensjon", Tidsskrift for den Norske Laegeforening (Norway) Volume 99, Nr. 30, pp 1530 - 1531, 1979			
16. Abstract Idiopathic orthostatic hypotension is an uncommon disease characterized by a drop in blood pressure when going from a recumbant to a standing position. Treatment by medication generally produces poor results. Three patient's at the Royal Hospital in Oslo were treated with antigravity suits and all were able to maintain adequate blood pressures in the standing position. One patient improved dramatically and was able to take short walks while wearing the suit. The two other patients, however, felt that wearing the suits eventually became uncomfortable. This treatment represents a useful treatment alternative for intractable cases.			
17. Key Words (Selected by Author(s))		18. Distribution Statement Unclassified-Unlimited	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 8	22. Price

THE USE OF ANTIGRAVITY SUITS IN THE TREATMENT OF IDIOPATHIC
ORTHOSTATIC HYPOTENSION

K. Landmark
S. Kravik

Medical Department B, Royal Hospital
Oslo, Norway

Introductory Note: Treatment Methods at our Hospitals

Presented here are treatment methods for actual diseases as practiced at some of our hospitals. The published treatment methods, naturally, do not claim to be the only correct methods. Commentary and questions are welcome and might be published in the correspondence column. If the contents of these articles are to be reported in the mass media, we ask that this be done in cooperation with the Editor.

/1530*

Idiopathic Orthostatic Hypotension

Idiopathic orthostatic hypotension (Shy-Drager's syndrome) is characterized by a drop in blood pressure and lack of a rapid pulse when assuming the standing position, something which is indicative of a breakdown in the autonomic motor system. In addition to dizziness and syncope, the condition is characterized by varying degrees of nervous system symptoms. The usual treatment with medication can lead to some improvement, but is most often ineffective. We have attempted to use antigravity suits with three patients with idiopathic orthostatic hypotension, and this led to an apparent decrease in the blood pressure drop and a reduction in the problems of going from a recumbant to a standing position. However, two of the patients felt that, in the long run, the antigravity suit was uncomfortable to wear. The use of an antigravity suit represents an alternative method of treatment of extremely intractable conditions such as idiopathic orthostatic hypotension.

Idiopathic orthostatic or primary postural hypotension (Shy-Drager's syndrome) is an uncommon condition which is characterized by a drop in blood pressure when in the standing position and the lack of a reflexive

* Numbers in the margin indicate pagination in the foreign text.

Table 1: Symptomatology of idiopathic orthostatic hypotension

Patient #	1 (man)	2 (man)	3 (woman)
Dizziness	+	+	+
Syncope	+	+	-
Bladder damage	+	-	+
Fasciculations in extremities	+	-	+
Tremor	+	-	-
Distal muscular atrophy	+	-	+
Dysarthria	-	-	+
Unstable gait	+	-	+
EMG	+	+	
EEG	+	-	+
Reflexes	normal	normal	normal

EMG + = signs of peripheral neurologic lesion.
 EEG + = signs of cerebral dysrhythmia.

increase in pulse rate, i.e. a deterioration of the autonomic regulation of blood pressure and heart rate. This leads to reduced volume of circulation per minute, a drop in the peripheral vascular pressure and a decrease in cerebral blood flow, which leads to dizziness and possibly syncope (3,4,9). In addition, there are usually bladder and rectum damage, impotency, iris atrophy, external ophthalmoparesis, tremor, distal muscular atrophy, anhidrosis and EMG changes (6). These symptoms will often first manifest themselves several years after the appearance of the hypotension (12). The condition, which generally occurs in the 50 to 70 year age group (11), is evenly, but slowly, progressive. Men are more often affected than women. Pathologically and anatomically, evidence has been found for primary central nervous system degeneration with secondary degeneration of the autonomic nervous system in the medulla spinalis, basal ganglia and in the cerebellum (6, 11).

Aminoff and Wilcox (1) have found evidence of central/peripheral lesions of the sympathetic nervous system. Chokroverty and coworkers (4) found, in addition, dysfunction of the parasympathetic nervous system. Treatment is symptomatic, and various medication regimens have been tried, such as Effortil (2,6), Florinef (9-alpha-fluorohydrocortison) (6), MAO inhibitors in combination with noradrenalin-releasing substances (8), and ephedrine combined with propranolol (7). All of these have been used with some varying, but never overwhelming, success. Some positive reports have been written about antigravity suits. In the course of the past two years, we have had three patients in our department with idiopathic orthostatic hypotension. We have treated these patients with

antigravity suits and our experience with this method of treatment is presented here.

The Subjects

Three patients, two men and one woman, all in the 60 to 65 year age group with one to six year histories of idiopathic orthostatic hypotension, were patients in Medical Department B at the Royal Hospital between 1976 and 1978. The most important objective and subjective findings are summarized in Table 1. In addition to dizziness and a tendency toward syncope, two patients also exhibited some neurological symptoms. The usual laboratory tests and EKGs were normal. None of the patients showed signs of heart or vascular disease. Renin in the peripheral blood was normal. Before admission to our department, all of these patients had been hospitalized locally and had been treated with Effortil, Florinef and salt supplementation, among other things, without definite improvement. Recumbant, patient #1 and patient #2 had normal blood pressure levels, but patient #3 had an elevated level (see Table 2). All, upon assuming a standing position, became rapidly dizzy and blood pressure dropped significantly without there being a reflexive increase in the pulse rate. None became diaphoretic or clammy. Patient #1 fell after about one-half minute in the standing position, accompanied by gasping respirations. However, there were no cramps or loss of bowel or bladder control. Blood pressure was not measurable. After being placed in bed, this patient rapidly became alert. Treatment with antigravity suits (CSU-3/P*) /1531 was tried with these three patients. For patient #1, whose condition was the most serious of the three, this resulted in a dramatic improvement. Going from recumbant to standing position now, his blood pressure dropped from 130/80 to 80/55 without his becoming dizzy (Table 2), and he became well enough to go on walks in the corridors (Figure 1). In the other two patients as well, the blood pressure drop was reduced. Patient #2 indicated that his dizziness went away and patient #3 indicated that it had become less pronounced. However, both of these patients indicated that wearing the suit became uncomfortable after a while.

* On loan from the Air Force Research Command, Kfeller, Norway.

TABLE 2: Blood pressure levels with and without antigravity suit in three patients with idiopathic orthostatic hypotension.

	Without suit		With suit	
	Blood pressure	Pulse	Blood pressure	Pulse
Patient #1				
Recumbant	115/80	64	130/80	
Standing	0	64	80/55	
Patient #2				
Recumbant	125/70	74	150/95	80
Standing	60/35	88	80/55	80
Patient #3				
Recumbant	240/140	76	240/140	
Standing	95/70	76	120/100	

DISCUSSION

Treatment with medication of idiopathic orthostatic hypotension, which is a steadily progressive disease (4, 11, 12), has for the most part given poor results (2, 6-8), which was also the case for our patients. Previously, elastic bandages on the lower extremities had been tried, and this had given a certain amount of temporary relief.

Crile (3), in 1903 made use of a new principle to prevent critical hypotension during neurosurgery on the brain and neck in the sitting

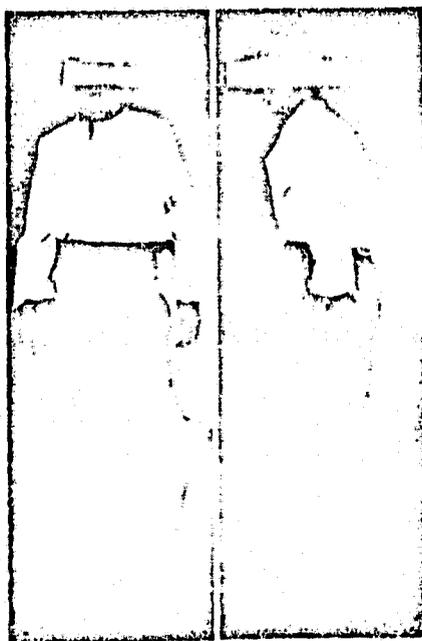


Figure 1: Patient wearing antigravity suit under pressure

position. A pant suit with inflatable rubber chambers was strapped directly to the skin from the ankle region to the diaphragm. During World War II, fighter planes became faster and the incidence of syncope among pilots during dives became greater. Blood collected in the lower portions of the body, and this gave rise to too little blood flow to the retinae (greyout), immediately followed by frank syncope (blackout). In order to counteract the tendency for syncope, American aviation

physicians constructed the so-called antigravity suit. In doing so, they used the same principle used by Crile (5) on his patients fifty years earlier. The name 'antigravity' accurately expresses the objective: A rubber chamber contained within a suit surrounds the skin from the ankle region to the waist. When placed under pressure (20 to 30 mm Hg), the vascular capacity of the lower extremities is reduced and an autotransfusion of organs above the diaphragm takes place (10), so that venous back-flow and volume of circulation can be maintained (9). Perfusion to the lower extremities is good at all times (10), since the suit pressure is far below the blood pressure. Antigravity suits have been used in the treatment of idiopathic orthostatic hypotension by several authors with satisfactory results (3,9). It is known that the condition is accompanied by a significant drop in the volume of circulation per minute (3,4,9). Rosenhamer and Thorstrand (9) found in one patient with idiopathic orthostatic hypotension a fall in circulation volume per minute from 4.6 liters to nonmeasurable levels in the standing position. When using an antigravity suit, the drop was only 1.6 liters.

Our patients, all of whom had previously been treated with various medications without definite improvement, experienced both subjective and objective improvement of the symptoms of idiopathic orthostatic hypotension after inflation of the antigravity suits. One patient was discharged with an antigravity suit, while the other two felt that in the long run these were uncomfortable to wear. We feel that in spite of this, the antigravity suit represents a useful alternative treatment method for a very intractable disease such as idiopathic orthostatic hypotension.

REFERENCES

1. Aminoff, M.J. and C.S. Wilcox, "Assessment of autonomic function patients with a parkinsonian syndrome," Br Med J, (4), 80-84, (1979).
2. Ankerhus, J. and E. Hansen, "A controlled trial with a new preparation of etilefrini chloridum with prolonged effect (Effortil Prolongatum) on orthostatic reactions," Curr Ther Res 11, 338-343, (1969).
3. Bevegard, S., B. Jonsson and I Karlof, "Circulatory response to recumbant exercise and head-up tilting in patients with disturbed sympathetic cardiovascular control (postural hypotension) Acta Med Scand 172, 623-636 (1962).
4. Chokroverty, S., et al, "The syndrome of primary orthostatic hypotension," Brain 92, 743-768, (1969).
5. Crile, G. W., "Blood pressure in surgery: An experimental and clinical research," J.B. Lippincot Co, Philadelphia, 288-291, (1903).
6. Heieren, E. "Primary postural hypotension: Two cases of Shy-Drager's syndrome," Tidsskr Nor Laegeforen 92, 1115-1119, (1972).
7. Kochar, M.S. and H.D. Itskovitz, "Treatment of idiopathic orthostatic hypotension (Shy-Dragers syndrome) with indomethacin," Lancet 2, 1011-1014, (1978).
8. Lewis, R.K., et al, "Therapy of idiopathic postural hypotension," Arch Intern Med 129, 943-949, (1972).
9. Rosenhamer, G. and C. Thorstrand, "Effect of g-suit in treatment of postural hypotension," Acta Med Scand 193, 277-280, (1973).
10. Roth, J.A. and R.B. Rutherford, "Regional blood flow effects of g-suit application during haemorrhage shock," Surg Gynecol Obstet 133, 637-643, (1973).
11. Shy, G.M. and G.A. Drager, "A neurological syndrome associated with orthostatic hypotension. A clinical-pathologic study," Arch Neurol 2, 511-527, (1967).
12. Thomas, J.E. and A. Schirger, "Neurologic manifestations in idiopathic orthostatic hypotension," Arch Neurol 8, 204-208, (1963).