

Release phenomena and iterative activities in psychiatric geriatric patients

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Summary: This survey was undertaken to assess the frequency of some of the so-called release phenomena and iterative activities in an aged psychiatric population. Three groups of geriatric psychiatric patients with diagnoses of (I) organic brain syndrome, including senile dementia (56), (II) functional psychoses, predominantly schizophrenia (51) and (III) chronic schizophrenia never treated by neuroleptics or other biologic agents (16), were compared with (IV) a control group of 32 elderly people in good physical and mental health.

In general, for the manifestations studied, the geriatric psychiatric patients suffering from an organic brain syndrome and treated with neuroleptics differed notably from the control group. This latter group, although older, had few neurological signs of senescence and the spontaneous oral movements usually associated with the use of neuroleptics were absent. Release phenomena such as the grasp and pouting reflexes, as well as the stereotyped activities, were encountered significantly more frequently in patients with an organic brain syndrome than in the two other groups of patients. Our survey has yielded limited results with regard to the possible influence of type of illness and neuroleptic treatment on the incidence of release phenomena and iterative activities.

Résumé: *Phénomènes de libération et activités itératives chez des vieillards souffrant de troubles mentaux*

La présente étude a été entreprise pour évaluer la fréquence de certains phénomènes de libération et certaines activités itératives au sein d'une population de

vieillards en milieu psychiatrique. A cette fin, on a comparé à un groupe de 32 vieillards en bonne santé physique et mentale, trois groupes de vieillards en milieu psychiatrique chez lesquels on avait posé un diagnostic (I) de syndrome cérébral organique, dont certains cas de démence sénile (56 cas), (II) de psychose fonctionnelle, principalement de schizophrénie (51 cas) et (III) de schizophrénie chronique jamais traitée par des neuroleptiques ou par d'autres agents biologiques (16 cas).

En règle générale, en ce qui concerne les manifestations qui sont ici étudiées, le vieillard souffrant d'un syndrome cérébral organique et traité aux neuroleptiques, différait sensiblement du groupe-témoin. Ce dernier groupe, pourtant composé de personnes plus âgées, ne présentait que peu de signes neurologiques de sénescence et les mouvements spontanés de la bouche qui sont la conséquence de l'emploi des neuroleptiques étaient absents. Des phénomènes de libération, notamment les réflexes de la préhension et de la moue, ainsi que les activités stéréotypées, se rencontraient beaucoup plus souvent chez les malades souffrant d'un syndrome cérébral organique que chez les deux autres groupes de malades. Notre étude n'a donné que des résultats limités quant à l'influence éventuelle du type de pathologie cérébrale et du traitement par les neuroleptiques sur la fréquence d'apparition des phénomènes de libération et des activités itératives.

In the senium psychiatric disorders are frequently related to, if not concomitant with, degenerative processes occurring in the brain, and elderly patients admitted to mental hospitals are often believed to be suffering from an organic brain syndrome.

When the brain has been altered by age and disease, several primitive responses, called either developmental or fetal reflexes, and normally present¹⁻³ during the early maturation of the central nervous system, may reappear.³⁻⁵ These manifestations have also been named release phenomena. The term "developmental" refers to their similarity to normal responses of early life, while the term "release phenomena" implies that they are unleashed as a consequence of an inadequate functioning of the higher inhibitory centres. When these developmental reflexes or release phenomena are persistent and prominent, in the

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absence of focal neurological signs of increased intracranial pressure, then the senile patient has usually severe diffuse, bilateral and irreversible damage of the central nervous system.³ In the same way, various stereotyped motor activities in old age have been associated with central nervous system degeneration.⁴ The simultaneous presence of several release phenomena, and maybe also of spontaneous and stereotyped motor activities, might be used as objective signs of organic impairment concomitant with the psychotic manifestations and serve as a guideline for diagnosis, treatment and prognosis at the time of admission of a patient.

Some studies dealing with the presence and type of release phenomena observed in very old age have already been published³⁻⁵ and various aspects of ageing have been the subjects of recent reviews.⁶⁻⁸ The relationship of some release phenomena to the tardive or persistent dyskinesias induced by neuroleptics has also been tentatively explored and the possibility that these phenomena were different and could be dissociable has been reported.⁹ This current survey has been undertaken with the aim of assessing the frequency of some release phenomena and some iterative activities in an aged psychiatric population. We also tried to clarify the relationship of these various manifestations to the type of psychiatric illness and the influence of psychotropic drugs, especially neuroleptics.

Population sample

We have therefore conducted our survey on three groups of geriatric psychiatric patients and a control group of normal elderly people. Group I was composed of 56 patients with a diagnosis of organic brain syndrome, 30 of them being affected with senile dementia. Group II consisted of 51 patients suffering from psychoses not attributed to physical conditions, that is functional psychoses,¹⁰ schizophrenia being the predominant diagnosis. Group III comprised 16 chronic schizophrenic patients who had never received neuroleptics or any other biological treatment. Group IV, the control group, consisted of 32 elderly people in good physical and mental health living in a private nursing home (Table I). Most patients in Groups I and II were still receiving a neuroleptic medication at various doses. Except for one patient in Group III, members of all groups were older than 65 years. The mean age of the control group was higher than that of the other three groups, and the mean age of Group III was higher than that of Group II.

Methods: reflexes and iterative activities studied

Five release phenomena and another manifestation called "tonic transmission", which is closely related to the release

phenomena, especially to the groping response, were studied. (For the purpose of presentation, this last manifestation will be included among release phenomena.) The intensity of these various phenomena varied from weak to very marked. The examinations required only a minimal degree of cooperation from the patients. The oral movements that can either occur sometimes spontaneously in old age or be induced by neuroleptics were also noted, as were some stereotyped activities. The examinations were all performed by the same investigator, except in Group III.

A. Release phenomena

1. Grasp (forced grasping) reflex

The grasp reflex is a flexor response of the fingers and hand following stimulation of the skin of the palmar surface of the fingers or hand and is an exaggeration of the normal palmar reflex.^{11,12} There are two variations of the grasp reflex. The first one, the exteroceptive reflex,^{4,13} is characterized by flexion of the fingers when the palm or palmar surface of the fingers is stimulated. Finger closure precedes gripping and by the 16th week of fetal development a fist may be formed whenever the palm is touched. At around 2 to 3 months of life this reflex is less constant. The second variation is a tonic response called the forced grasping reflex which lasts up to the end of the first year. It is pronounced in the newborn and the grip can be so firm that an examiner may lift the child by the fingers. This forced grasping reflex may be considered as related to the counterholding phenomenon (Gegenhalten), when muscle contraction develops in response to contact and as a resistance to changes in position and posture. In some instances the forced grasping reflex triggers a sequence of rhythmic marching movements constituting a groping response.^{11,14}

The presence of cerebral hemispheres is apparently not necessary for the grasp reflex, since anencephalic infants usually display a firm one.³ In older geriatric patients this reflex occurs as a release phenomenon and is suggestive of contralateral frontal lobe disease. It has also been observed in association with spastic hemiplegia of cerebral origin, but seems to appear more frequently with frontal lobe tumours and vascular lesions of these areas. It is also observed in diffuse cerebral degenerative processes and then can be bilateral.¹¹ For instance, in bilateral lesions of the cortex, especially in Brodmann's area 6, bilateral forced grasping may be elicited.^{11,15} The grasp reflex has also been reported in comatose patients and in lesions of the posterior fossa, mostly as a consequence of increased intracranial pressure.¹¹

2. Sucking reflex

This reflex can be provoked by either tactile or visual stimulation.⁵ In the first method, the medial area of the superior lip of the blindfolded patient is stimulated with a tongue blade or the tip of a finger, and if no reaction is elicited the commissures of the lips are then stimulated. If there is still no response a slight pressure is exerted between the two lips. The reflex can also be triggered by a visual stimulus, e.g. by showing the patient, who is placed in front of the examiner, the tip of a tongue blade or moving a finger slowly towards his mouth but without touching it.

In both instances the patient reacts by opening his mouth in order to seize the object, to suck it or lick it. In the most deteriorated patients an orientation reflex ("points cardinaux") consisting of a displacement of the tongue, mouth or head toward an object can be induced by stimulating the perioral mucosa and the tongue. The tongue

Table I—Patient population

Groups	Diagnoses*	No. of subjects (Total, N = 155)	Sex		Age		
			Male	Female	Mean ± S.D.	Range	
I	Psychoses associated with organic brain syndromes	56	55	1	76.0 ± 7.2	65-93	
II	Psychoses not attributed to physical conditions	51	33	18	70.9 ± 5.8	65-87	
III	Schizophrenia**	16	0	16	76.3 ± 8.8	62-96	
IV	Normal controls	32	11	21	83.2 ± 4.9	73-93	

*Diagnoses according to the APA, DSM - II, 1968.¹⁰

**Group of chronic geriatric schizophrenic patients never treated with neuroleptics or any other biological therapy.

then turns towards the excited site, the mouth sometimes also deviating in the same direction.⁵ The sucking and the grasp reflexes may sometimes coexist and the patient then moves his hand towards the object in order to catch it and to bring it to his mouth.⁵

In the infant, if the lips are stimulated, mouth movements, involving the lips, the tongue and the jaw, trigger a sucking response.¹¹ If the stimulation persists the child turns his head towards the stimulus in an orientation reaction called the rooting reflex. The sucking and rooting reflexes can be differentiated, the mouth movements preceding the rooting reflex in fetal development.^{1,16,17} The afferent impulses are carried through the Vth and IXth cranial nerves and the efferent ones through the Vth, VIIth, IXth, XIIth cranial and the spinal nerves. In adults these reflexes are present when the supranuclear pyramidal tract is damaged and in patients with a diffuse brain disease and severe cerebral degeneration.¹¹ The rooting reflex may then be identical with the one described in children.

3. Snout or pouting reflex

The snout or pouting reflex is closely related to the sucking reflex and consists of a puckering or protrusion of the lips due to the contraction of upper and lower portions of the orbicularis oris, as well as of the muscles about the base of the nose.^{3,11} It is elicited by a light tap beneath the nose or by applying a quick pressure just above the upper lip. Many patients with a sucking reflex will also show pouting. This reflex is not usually present in normal people except during the first year of life, but pouting has been reported, though weakly marked, in some normal people, especially if they have a powerful musculature, as well as to be common during excitement and particularly chagrin in elderly patients.³ The pouting reflex has been observed in association with bilateral supranuclear lesions.¹¹ Its presence has also been reported in hepatic coma, in toxic or traumatic states involving the frontal cortical areas, with the occlusion of the anterior cerebral artery, and in senile and presenile dementia.^{4,18,19} The afferent pathway for this reflex runs through the trigeminal nerve and the efferent path through the facial nerve.

4. Palmomental reflex

The palmomental reflex of Marinesco and Radovici consists in a contraction of the muscles of the chin and in an elevation and retraction of the angle of the mouth in response to either scratching or tapping the thenar region of the hand from the base of the thumb to the wrist; the response is ipsilateral.¹¹ The significance of this reflex is disputed and it is held by some to have little clinical value, almost half of normal adults having a positive palm-chin or palmomental response, although it is rarely prominent or persistent.³ What makes it significant is its briskness and constancy rather than its presence or absence.

This reflex is almost always present in senile patients presenting a clear sucking reflex.⁵ It may be found in association with diffuse cortical degeneration, as well as with frontal lobe lesions, but is absent in peripheral facial palsy and in lesions of the brachial plexus.¹¹ It is increased in central facial paresis and in conditions such as amyotrophic lateral sclerosis or lesions of the lower brain stem.^{11,20}

5. Hypertonia

An increased rigidity both in the motor and psychological fields constitutes one of the characteristic features of senility. In the motor area, a typical manifestation often

observed is the phenomenon of "Gegenhalten", a particular form of rigidity, also called "negativism" or "opposition hypertonia".^{3,4,21}

In this type of hypertonia the marked increase in tone is not consciously determined and is accentuated when a rapid passive movement is imparted to a limb. The patient resists execution of the movement initiated by the examiner. It is different from the spasticity of the "clasp-knife" type and from the "cogwheel" rigidity of parkinsonism.³ In our survey, any resistance of the forearm to the passive movement imparted by the examiner has been considered as a hypertonic manifestation.

The physiology of paratonic rigidity is unknown, but this form of rigidity appears to have some similarity with the extrapyramidal rigidity seen in parkinsonism. Both hypertonia and the grasp reflex are present in normal infants between the 2nd and 8th weeks of life. In adults, paratonic rigidity has been observed in disease of the frontal lobe²² and it is also frequent in metabolic diseases, in vascular cerebral diseases and in alterations of consciousness varying from moderate obtundation to deep coma.²³

6. Tonic transmission

As stated previously, this manifestation seems closely related to the release phenomena by reason of its relationship with the groping response.¹¹ In contrast with opposition hypertonia, once the resistance to the movement has been overcome, the movement is pursued automatically by the patient as long as a contact, even a light one, is maintained by the hand of the examiner, and it may continue twice or thrice once the contact has ceased. For example, if flexion and extension movements of the forearm are initiated by the examiner, the patient will pursue them as long as the contact is maintained, and may even continue them two or three times once it is interrupted.^{4,5}

B. Some iterative activities

1. Spontaneous oral movements

Various forms of spontaneous and induced oral activities have been described in great detail in senile dementia,⁵ some bearing a close similarity to the tardive or persistent dyskinesias, especially the protrusion and suction of the tongue, and the chewing and masticatory movements. It is not clear, however, whether the patients observed had been receiving at any time a neuroleptic medication.⁵ Nevertheless, it has been reported that similar spontaneous oral movements can occur, although with a rather lower frequency, in geriatric psychiatric patients in the absence of any neuroleptic treatment and in the elderly.²⁴⁻²⁸ For instance, some spontaneous extrapyramidal, hyperkinetic and choreo-athetotic movements have been noted in about 1% of geriatric patients showing definite symptoms of senile dementia and who had never received neuroleptics, but the percentage was significantly higher (9.9 to 18.7%) in similar groups treated with neuroleptics, especially in women.²⁴⁻²⁵

2. Other stereotyped activities

Several stereotyped motor activities have been described in demented patients suffering from severe chronic brain syndromes. The iterative activities reported were kneading, folding, smoothing, thrumming, as well as polymorphic movements of the hands, legs or whole body.⁴ However, continuous observation of patients attending to their daily routine would have been necessary in order to assess the exact frequency of these various stereotyped manifestations and this was not feasible in our survey.

Results

Some general trends emerge from the data (Tables II and III, Figs. 1 and 2). It can, indeed, be noted that, in general for the various manifestations studied, the population of geriatric psychiatric patients suffering from an organic brain syndrome and treated with neuroleptics (Group I) differs notably from the control group (Group IV) and this is confirmed by statistical analysis (Table III and Fig. 1). The control subjects, although older, show few neurological signs of senescence, and the spontaneous oral movements similar to those usually associated with the use of neuroleptics are absent. It can also be observed that release phenomena such as the grasp and pouting reflexes are encountered significantly more frequently in Group I than in the two other groups of patients (Table

III and Fig. 1). Our initial expectation that some clear differences might exist with respect to release phenomena and iterative activities between Group I and Groups II and III (influence of the type of psychiatric illness), and between Group II and Group III (influence of treatment) was not supported by the statistical analysis (Table III and Fig. 1). Significant differences between Group I and Groups II and III were found only for the grasp and pouting reflexes, but the statistical analysis has not found a significant difference between the latter two groups and the control group (Group IV). No significant difference was detected between Groups II and III for any of the manifestations observed. The frequency of association of most of these manifestations was noted by combining Groups I and II.

Table II—Frequency of release phenomena and iterative activities in geriatric psychiatric patients as compared with normal elderly people

Release phenomena and iterative activities	Group* I N = 56		Group II N = 51		Group III N = 16		Group IV N = 32	
	No.	%	No.	%	No.	%	No.	%
Grasp reflex	14	25	2	4	1	6	0	0
Sucking reflex	22	39	11	22	3	19	2	6
Pouting reflex	44	79	22	43	2	12	7	22
Palmomental reflex	34	61	26	51	6	37	9	28
Hypertonia	28	50	19	37	3	19	0	0
Tonic transmission	9	16	6	12	3	19	0	0
Spontaneous oral movements	17	30	16	32	5	31	0	0
Stereotyped activities	9	16	2	4	0	0	0	0

*Composition of groups listed in Table I.

Table III—Frequency of release phenomena and iterative activities: comparisons between groups

Release phenomena and iterative activities	Comparisons* between groups**					
	IV			I		III
	I	II	III	II	III	II
Grasp reflex	<0.01	NS	NS	<0.01	NS	NS
Sucking reflex	<0.01	NS	NS	NS	NS	NS
Pouting reflex	<0.001	NS	NS	<0.02	<0.01	NS
Palmomental reflex	<0.05	NS	NS	NS	NS	NS
Hypertonia	<0.001	<0.001	<0.05	NS	NS	NS
Tonic transmission	<0.02	<0.05	<0.05	NS	NS	NS
Spontaneous oral movements	<0.001	<0.01	<0.005	NS	NS	NS
Stereotyped activities	<0.02	NS	NS	<0.05	<0.005	NS

*Statistical analysis: comparisons using the chi-squared one sample test or by the binomial test when the expected frequencies were too small.^{3,4}

**Composition of groups given in Table I.

COMPARISONS BETWEEN GROUPS*

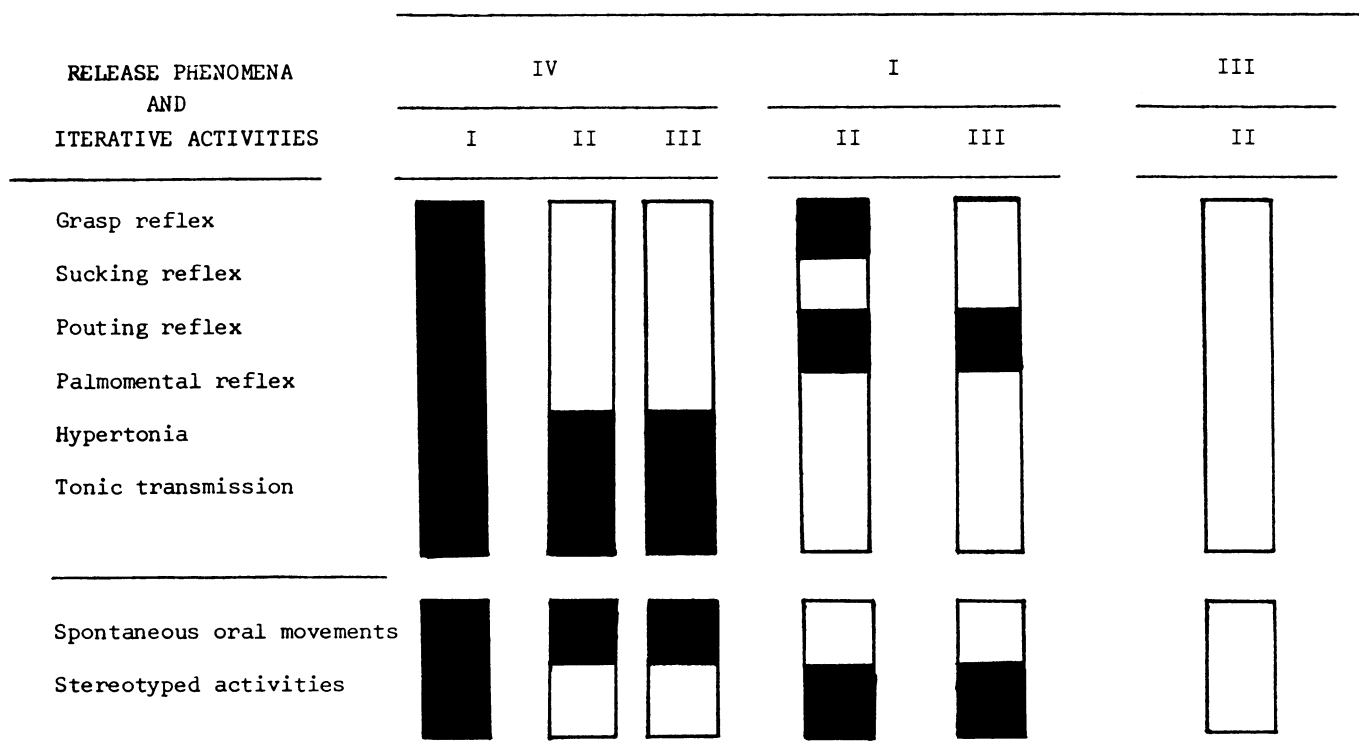


FIG. 1—Frequency of release phenomena and iterative activities: comparisons between groups (composition of each group given in Table I). Black areas indicate statistically significant differences in frequency; white areas indicate no significant difference.

A. Release phenomena

1. Grasp reflex

The grasp reflex was observed with the highest frequency in Group I (Table II, Fig. 2) and was associated particularly with the pouting reflex and hypertonia. It was absent in the control group (Group IV).

2. Sucking reflex

This reflex was elicited most often in Group I (Table II, Fig. 2). It was mainly associated with the pouting and palmomental reflexes and with hypertonia.

3. Pouting reflex

The pouting or snout reflex was detected in all groups, but more frequently in Group I (Table II, Fig. 2). It was usually associated with the palmomental reflex and hypertonia.

4. Palmomental reflex

The palmomental reflex was observed in all groups but with a greater frequency in Group I (Table II, Fig. 2). It was prominently associated with the pouting reflex.

5. Hypertonia

Hypertonia (Gegenhalten, opposition hypertonia, negativism) was found exclusively in the three groups of patients (Table II, Fig. 2). Hypertonia was frequently associated with the pouting, palmomental and sucking reflexes.

6. Tonic transmission

This phenomenon was noted with a similar frequency in all three groups of patients (Table II, Fig. 2).

B. Iterative activities

The iterative activities studied, that is the spontaneous oral movements and certain stereotyped activities, were absent in the control group.

1. Spontaneous oral movements

Spontaneous oral movements were observed in the three groups of patients, even in the group of schizophrenics never treated with neuroleptics (Group III), but were absent in the control group (Table II, Fig. 2). These movements were practically indistinguishable from the oral tardive or persistent neuroleptic-induced dyskinesias, the patients showing either a bucco-lingual or a bucco-linguo-masticatory syndrome. These oral movements were more often associated with oral release phenomena such as the palmomental, pouting and sucking reflexes.

2. Stereotyped activities

Stereotyped activities were present mainly in patients in Group I (Table II, Fig. 2), almost exclusively in those suffering from senile dementia. In decreasing order of frequency, kneading, folding, smoothing, thrumming, rubbing of the hands and fingers, crossing of the legs and flexion of the trunk were observed. The limited length of time of observation obliges us to restrict our comments regarding these activities, except that they coincide with the presence of other release phenomena.

PERCENTAGE

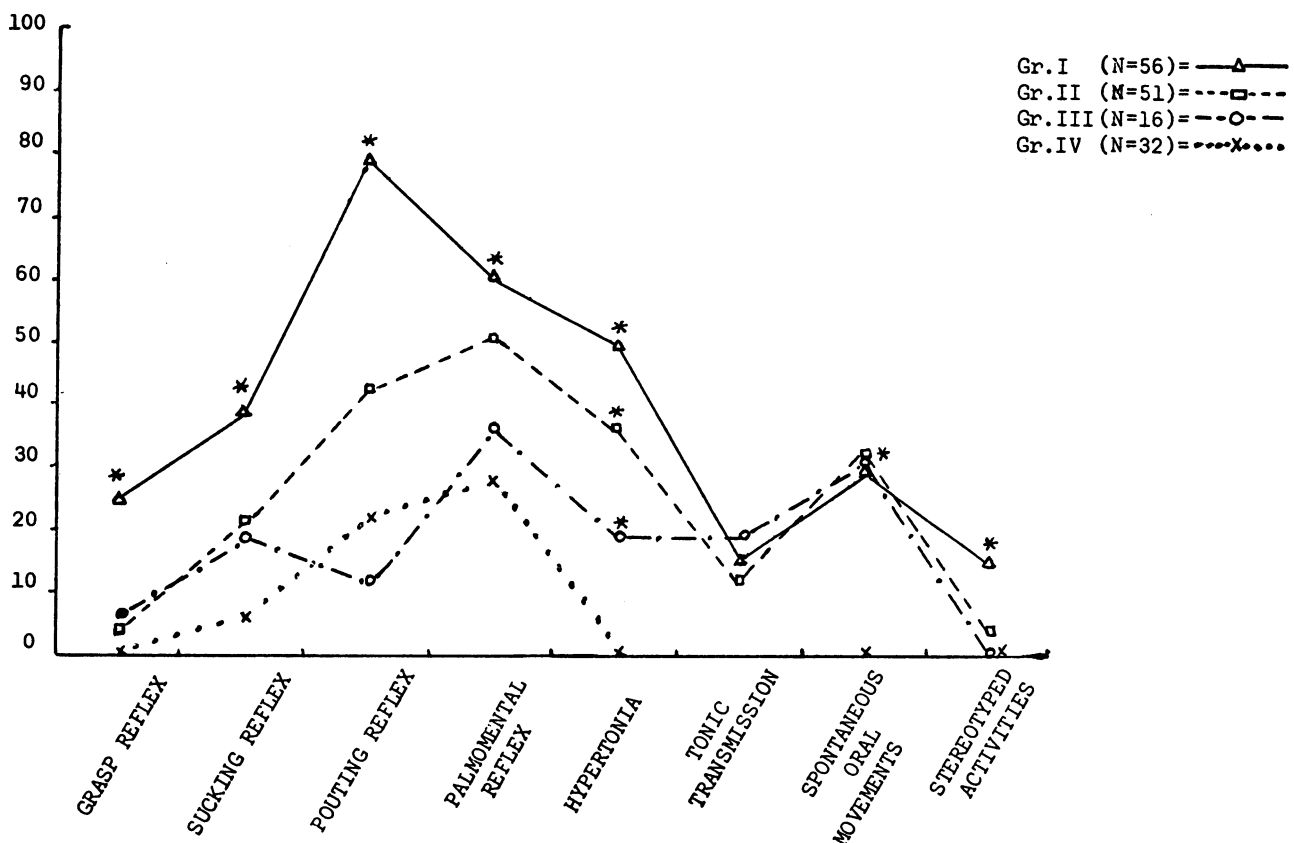


FIG. 2—Frequency of release phenomena and iterative activities in geriatric psychiatric patients as compared to normal elderly people. *Statistically significant difference from normal control group.

Discussion

Over the years, while investigating in our hospital the oral and choreo-athetotic dyskinesias believed to be associated with the use of neuroleptics, we have been struck by the fairly frequent concomitant presence of the pouting and palmomental reflexes that we were searching for systematically. Often we speculated about the respective roles of age, brain damage or degeneration, and intake of neuroleptics in relation to the tardive or persistent dyskinesias, mainly the oral ones, in the psychiatric patients examined. We had given consideration to the frequency of occurrence of dyskinesias similar to the tardive or persistent dyskinesias and of some release phenomena in elderly people in good physical and mental condition.

The main finding of our present survey of release phenomena and some iterative activities has been that a significant difference exists between geriatric psychiatric patients suffering from an organic brain syndrome (Group I) and a control group of normal elderly people (Group IV). Not all our patients have shown these phenomena, no patient presented all the manifestations explored, and in Group I their incidence was higher in patients suffering from senile dementia.

From a methodological standpoint, we interpret our results with some caution because the group of patients could not be perfectly matched with respect to age and total amount of neuroleptics received (Groups I and II), and in addition the sample size of the group of chronic schizophrenic patients never treated (Group III) was understandably small. For instance, Group I (organic brain syndrome) tended to receive a smaller total amount of neuroleptics than Group II (functional psychoses). Moreover Group III (schizophrenic patients previously never treated) had a mean age greater than that of Group II and constituted a small particular group having never received insulin therapy, ECT or neuroleptic medication. This imperfect matching may have had some impact on the results, for some variables differed in the various groups. Thus the fact that the mean age of Group II was lower (70.9) than that of Group I (76.0) and Group III (76.3) may on the one hand have decreased the frequency of release phenomena and iterative activities in the group. On the other hand, the fact that patients in Group II tended to receive a higher total amount of neuroleptic drugs than patients in Group I may have increased the frequency of these symptoms. Finally, the fact that patients in Group III had never been treated before may on the one hand have diminished the incidence of the phenomena studied in comparison with Groups I and II, but on the other hand the fact that their mean average age was higher than that of Group II may have increased it.

The interpretation of some of our results is difficult. The presence of hypertonia in all three groups of patients, even in the small group of chronic geriatric schizophrenics never treated with neuroleptics (Group III), hinders us from distinguishing the respective roles of negativism due to schizophrenia and organicity due to ageing in this group, and in Groups I and II a third factor, the parkinsonian rigidity that may have been induced by neuroleptics, is added. With respect to tonic transmission, its significance is at times hard to assess: some people in the control group who had no hypertonia executed with docility the movement imparted by the examiner and responded to his tactile support of the forearm. The significantly greater frequency of stereotyped activities in Group I is a recognized phenomenon in this group of patients suffering from brain damage.

The spontaneous oral movements identical to those associated with the use of neuroleptics and noted in the three groups of psychiatric patients were absent in the

control group, but here again the problem arises of determining the respective roles in their etiology played by brain damage, schizophrenia (in Groups II and III) and the intake of neuroleptics. Their presence in Group III, the only homogeneous group as far as a specific diagnosis is concerned, does not exclude the possibility of an organic etiology, the mean age in this group being higher than in Group II. In addition, it is impossible to decide, in the presence of schizophrenia, whether these oral movements are merely stereotypies or if the two factors, specific illness and organicity, are superimposed. It is indeed often difficult in old schizophrenic patients to decide whether the oral dyskinesias must be attributed totally to the neuroleptic medication given. The cause and mechanisms of motor disturbances and stereotyped movements in schizophrenics had been debated vigorously long before the introduction of neuroleptics in psychiatry.²⁹ It is, however, justifiable to attribute directly to the use of neuroleptics the rapid tremor of the lips and mouth called the rabbit syndrome³⁰ when it is encountered in psychiatric patients. These movements were not observed in this survey.

As has been pointed out by other investigators, the number of patients showing release phenomena obviously depends upon the population studied.³⁰ The accurate assessment of these phenomena is also difficult, especially when the response elicited is weak, and this fact may account for discrepancies in results among investigators. The percentages that we have obtained present some similarities to, and differences from, those reported by others. For instance, the percentage of patients in Group I (organic brain syndrome) showing a grasp reflex (25%) is fairly close to that (18%) of another study,³ whereas in our control group the percentage with pouting or snout reflex (22%) is fairly similar to the one reported for this reflex (16.8%) in a study of various reflexes in a larger normal population of the same age group.¹²

Conclusion

Although our survey has yielded limited results with regard to the possible influence of type of illness and neuroleptic treatment on the incidence of release phenomena and iterative activities, it has nevertheless shown that the frequency of such manifestations was significantly higher in patients suffering from an organic brain syndrome than in controls. A clear-cut difference between the various groups has been shown only for the phenomena of hypertonia, tonic transmission and spontaneous oral activities, manifestations whose interpretation in term of exact causality is difficult.

Although no connection has been established between the presence and frequency of the manifestations studied and neuroleptic treatment, it must be kept in mind that the permanent or reversible tardive neurological complications occur usually after the age of 50 to 60 and that patients suffering from some kind of brain damage may be more susceptible to them. Moreover, aged patients are more sensitive to drugs than are young adults and neuroleptics must be used selectively and in lower doses in geriatric psychiatric patients. With respect to the tardive or persistent dyskinesias and to the mechanisms of their production, the exact role of the neuroleptics is still obscure.³¹ The possibility of a toxic effect of the neuroleptic drugs, consisting in an interference with cell membrane function and inhibition of respiratory enzymes in the cells, has been raised.^{31,32} For instance, the total brain oxygen consumption in patients over 50 years of age treated with a phenothiazine derivative has been found much less than in patients under 50.³³ Other hypotheses have also recently been posed. Current ongoing investigations by our research group tend to supply evidence that

oral dyskinesias have a complex physiopathology and may not constitute a homogeneous group.

With respect to release phenomena, iterative activities and other neurological manifestations, longitudinal studies, which would be the most valuable, have yet to be done. Such studies should be multidisciplinary and should explore the somatic and neurological aspects of senescence as well as its psychiatric facets, utilizing the multiple neurophysiological and biochemical techniques now at our disposal.

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