Rehabilitative Intervention and Social Participation of a Case with Balint's syndrome and aphasia

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Balint's syndrome is characterized by three major disorders of spatial analysis: fixed gaze or psychic paralysis, simultagnosia, and optic ataxia or misreaching. Most patients with Balint's syndrome generally do not show all three of these signs. The authors herein reported the more than four-year clinical course of a case (a 43-year-old man) with Balint's syndrome presenting these three disorders. The patient also had a mild type of conduction aphasia, but his attentional, intellectual and memory functions were well preserved. SPECT showed cerebral hypoperfusion in the bilateral parieto-occipital areas. Whereas rehabilitative intervention with process specific approach for the impaired visual cognition seemed to be significantly ineffective, a functional adaptation approach successfully promoted the patient's social participation. However, the present patient could not help having to resign from his job. Additionally, double impairment of visual (including optic ataxia) and language functions made it impossible for him to obtain a new work. Like the present case, those who have a higher brain dysfunction, but retain good physical ability can hardly receive the benefit of the social welfare system in Japan. Legislation addressing this problem is a matter of great urgency.

Key words: Balint's syndrome, aphasia, rehabilitation, participation

INTRODUCTION

Balint's syndrome is clinically designated in a category containing three major signs: inability to scan the visual field in spite of normal eye-movement (fixed gaze or psychic paralysis), impaired simultaneous perception of more than one or a few objects (simultagnosia), and defection of visual guided reach (optic ataxia or misreaching). A defective estimation of distance is considered to be another major symptom [1]. The majority of patients with Balint's syndrome do not show all three of these major signs.

Balint's syndrome can be seen in a variety of clinical conditions, like Alzheimer's disease, multiple strokes, traumatic brain injuries, tumors, HIV infections, etc. It is, however, rarely seen in a patient with a non-dementing neurological disease [3].

Balint's syndrome is commonly accompanied by various neuropsychological problems such as amnesia, apraxia, unilateral spatial neglect, aphasia, etc. [2]. They vary in degree depending on the lesions and frequently aggravate the patient's handicap in their social life. The rehabilitative intervention for such cases, however, has not been fully discussed in literature.

This case report represents the more than four-year clinical course of a patient with Balint's syndrome and aphasia, but with well preserved attentional, intellectual and memory function. The authors discuss the effects and limitations of rehabilitative intervention on the impairment and disability, and also comment on the problems with the social and legal system in relation to the social participation of such a patient.

A CASE REPORT

A 43-year-old salesman in a company dealing in office equipment, with a history of cerebral infarction at the age of 9 was admitted to a hospital emergency room due to sudden unconsciousness on April 28, 2001. Although detailed information on the old apoplexy from his childhood was not obtainable, no clinical aftereffects remained and he had living a normal life without any difficulties. Neuroradiological examination revealed a fresh cerebral hemorrhage at the left temporal subcortical area. After surgical treatment, he was transferred to the authors' hospital for rehabilitative intervention on May 22, 2001.

On admission he was alert and fully oriented, but showed a little difficulty with communication due to mild aphasia. The major signs and symptoms of his speech were frequent letter paraphasia, difficulty in word-finding, and disturbed repetition of letters as well as words and short sentences. Grammar and verbal comprehension were relatively preserved. The clinical diagnosis of the language disturbance was considered to be conduction aphasia.

A neurological examination also clarified that he showed no abnormality in the cranial nerves except the right hemianopsia. Gross motor palsy was not found. Superficial and deep sensation were mildly disturbed on the right side of his body. Tendon reflex was slightly increased on the right upper and lower extremities.

Memory, intelligence, and attention were well preserved. Color identification and recognition of the faces of famous people were not impaired. There was no finding of apraxia, finger agnosia, autotopagnosia,

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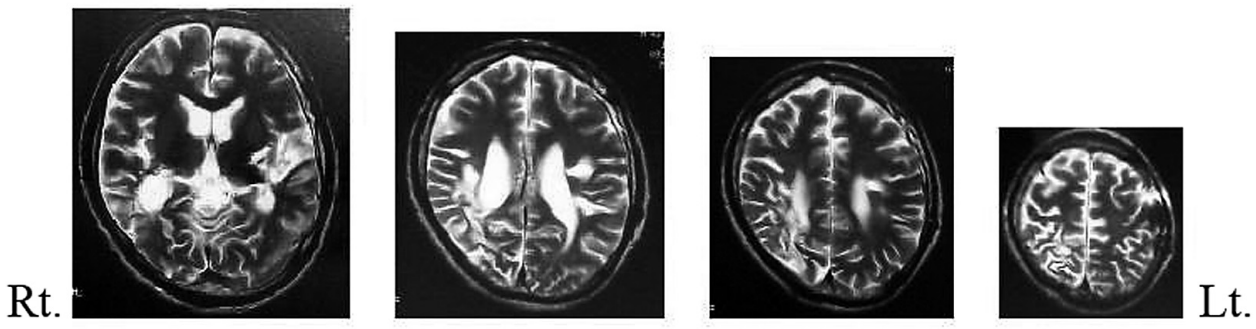

Fig. 1 MR images (6/2001).
There are subcortical high-signal-areas in the right parieto-occipital and left temporo-parietal areas.

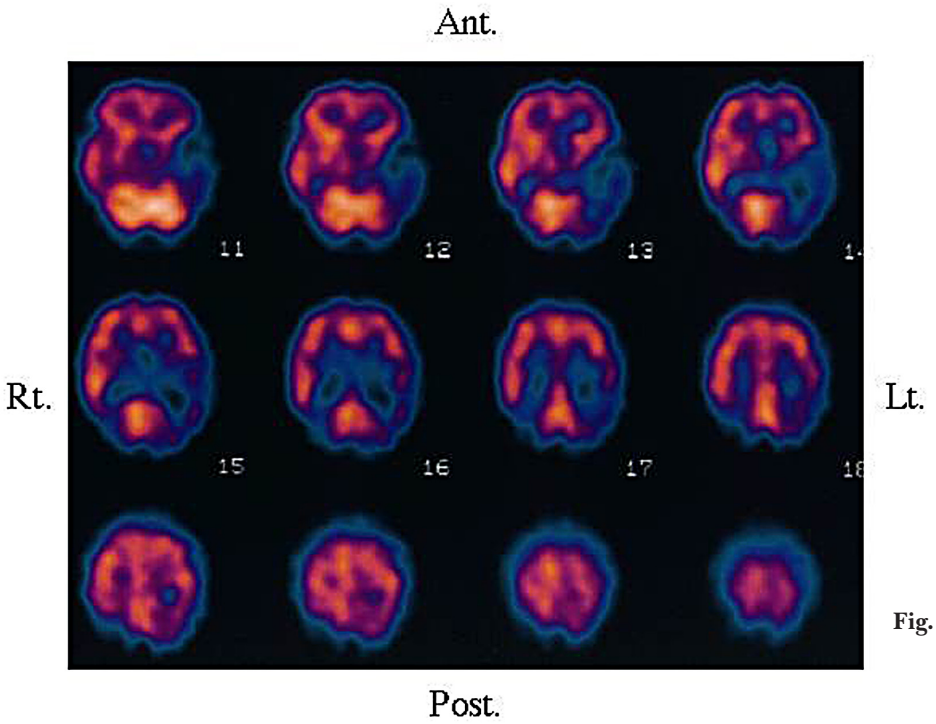

Fig. 2 SPECT (6/2001).
Bilateral hypo-perfusion of the parieto-occipital and left temporal regions is found.

right-left agnosia, or unilateral spatial neglect.

He, however, was unable to reach target objects with either hand. Although the ADL (activities of daily living) was almost independent, he showed some difficulties in visually-guided performances (such as picking up small foods, inserting coins into vending machines, dialing the telephone, etc.) because of this misreaching.

He could not scan moving objects. Saccades and pursuit eye movements under verbal command were also impaired.

The patient often reported a great deal of difficulty in visually perceiving more than one object at a time and said that objects in the visual field disappeared when he put his visual attention toward other things. He showed difficulties in fixing on a target object that was not placed within his central vision. These were considered to be typical signs and symptoms of simultagnosia. He was not able to count dots, nor compare the size and length of two or more objects. Perspective was lost, as well. Thus he walked like a blind man with his hands stretched out in front. He showed great difficulties with walking in the darkness, walking on a road covered with snow, and climbing and descending stairs.

The copying of objects was defective. He was able to draw simple figures but could not close the lines in the figure. He could not locate a point in the center of a circle. His reading ability was moderately disturbed. One reason for this dyslexia may be aphasia, but the main reason was his inability to properly trace the next line or paragraph, which lead to skipping whole lines due to impaired visual cognition.

The abnormal findings above were thought to be compatible with a typical form of Balint's syndrome with three major spatial disorders of misreaching, ocular apraxia, and simultagnosia.

Because of his visual and language dysfunctions, he could not undergo standard neuropsychological tests such as WAIS-R and WMS-R.

Laboratory data showed no abnormalities except for mild hyperlipidemia (total cholesterol, 230 mg/dl). Antinuclear antibodies were negative.

The T2-weighted MR images showed subcortical high-signal-areas in the right parieto-occipital and left temporo-parietal regions. The left one was considered a new lesion (Fig. 1). Bilateral hypo-perfusion of the parieto-occipital areas together with the left temporal lobe was detected in SPECT (Fig. 2).

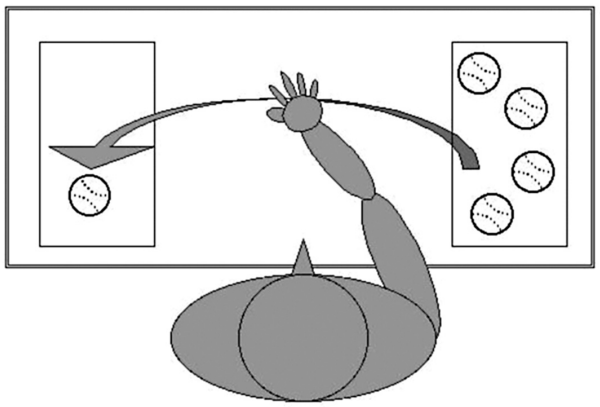

Fig. 3 A subtest of STEF.
The subject is required, as fast as possible, to pick up balls one by one from a right side storage space with the right hand and put them in a space on the left side (five balls in all). The completion time is measured. Both hands are evaluated separately. STEF consists of ten subtests using ten objects of different size and shape. The completion time of each subtest is rated on a scale from 1 (the slowest) to 10 (the quickest). The sum of each score (ranging from 10, the poorest to 100, the best) indicates the functional ability of the hand.

Table 1 Changes in the performance of VPTA and STEF
VPTA: corrrect answer (%), STEF: total score of ten subtests*[1]

	period for the rehabilitative intervention					
	Month / year					
VPTA & STEF	7/01	3/02	8/02	1/03	7/03	1/04
VPTA						
discrimination (length)	0	0	0	0	0	0
discrimination (shape)	17	50	67	50	67	50
counting dots	0	0	0	0	0	0
naming object	100	100	100	100	100	100
recognizing photos of famous people's faces	100	100	100	100	100	100
naming colors	100	100	100	100	100	100
copying figures	0	0	0	0	33	0
STEF						
(rt./lt. hands) (/100)	38/49	33/51	54/72		69/70	

Visually cognitive function evaluated by VPTA is shown to be almost unchanged throughout the time course. In STEF, hand function slightly improved although the best performance is still far below a normally functional level.
*[1], The cut-off score for the patient's age is 96.

The rehabilitative intervention and clinical course

The patient was treated with rehabilitation programs using visuoperceptual retraining and a functional adaptation program in divisions of occupational therapy and of clinical neuropsychology. For visuoperceptual retraining, the patient was required to find target objects in a scene painting or photograph in order to improve visual scanning. For treating simultagnosia, we developed a program in which the patient should compare attributes (i.e. size, shape, length, etc.) among two or more objects. A dot-counting task was also administered. Visually guided hand performance (picking up small things, inserting a stick into a hole, etc.) was trained to lessen misreaching.

In contrast to the visuoperceptual retraining above, which aim to restore the basic functions of visual cognition, the purpose of the functional adaptation program is to facilitate restoration of functional behaviors in the patient's real world. He was instructed to repeatedly practice several social and housekeeping activities in a safe way and place. The tasks included going for frequent strolls (around his neighborhood at first), commuting to the hospital alone using the hospital's shuttle bus (he was not able to use public transportation), washing dishes, cleaning the house, mopping the floor, etc.

After his leaving the hospital and returning home on September 30, 2001, we continued these programs in the outpatient clinic twice a week. During and after an 18-month training period, his visual cognition and hand performance under visual guidance were re-evaluated using the Visual Perception Test for Agnosia (VPTA) (Shinko Igaku Shuppann, Co., 1997) and Simple Test for Evaluating Hand Function (STEF) (Sakai Iryo, Co., 1985), respectively. The VPTA has been established by the Japan Society for Higher Brain Dysfunction as a Japanese standard test for examining the impairment of visual cognition. The STEF is a standardized test for upper-extremity functions, in which time required for completing a manual task is measured (Fig. 3). Table 1 shows the changes in the subtests of the VPTA and total score of the STEF. Although his hand performance seemed to slightly improve, his visual cognitive function was almost unchanged. The

Table 2 Changes in functional behaviors and community indepedence

	month / year	
	9/01	12/05
◆ coming to the hospital alone *1	impossible	possible
◆ housework *2	possible but taking time	more quickly
◆ using a push-button phone	impossible	somehow possible
◆ walking around the neighborhood	slowly and carefully	much faster
◆ area for daytime walking	only neighborhood	expanded area
◆ walking at night	with difficulty	with difficulty
◆ riding a bicycle	impossible	impossible
◆ driving a car	impossible	impossible
◆ shopping	impossible	possible
◆ work	suspended	retired
◆ mentally disabled person's certificate	not received	received
◆ disabled person's pension	not received	received

*1, using the hospital's shuttle bus

*2, washing dishes, cleaning the house, sweeping and mopping the floor, etc.

paraphasia, word-finding difficulty, and dyslexia were still present, which resulted in only a minor improvement in the communication ability.

Table 2 shows the change in his functional behaviors and community independence between two occasions, at discharge (September, 2001) and at the present time, December, 2005. His repertoire of functional behaviors were expanded and he was able to do housekeeping work more quickly and precisely. Thus, social participation and QOL significantly improved.

The patient, however, was ultimately forced to resign from his job, and was unable to obtain new work because of the double impairments of visual (including optic ataxia) and language functions. Thus, his financial problems resulting from his loss of income, should be addressed using the economical support establishment of the social welfare system. Because of his preserved motor function, however, he could not obtain a physically disabled persons' certificate or pension. The authors, therefore, applied those reserved for mentally disabled persons. The medical certificate application was initially rejected, but after repeatedly insisting on the legitimacy of the application to the local health center, he was finally able to obtain the mentally disabled persons' pension and reduce his financial burden.

DISCUSSION

The present case shows Balint's syndrome in a relatively pure form. Aside from the aphasia, no neuropsychological problems accompanied it. His intellectual and memory functions were well preserved.

The brain damage to the parieto-occipital area has been pointed out as the critical locus of the lesion for Balint's syndrome [1]. Diffuse lesions in both hemispheres due to cerebral anoxia, encephalitis, trauma, and degenerative diseases may also cause this syndrome [3]. In the present case, the recurrence of cerebrovascular accidents produced Balint's syndrome and aphasia. Although the lesions detected in MR imaging were located in subcortical areas, SPECT showed decreased cortical blood flow in bilateral parieto-occipital regions.

No effective and specific intervention of cognitive rehabilitation for Balint's syndrome has yet been established [3]. Sohlberg [6] described three forms of cognitive rehabilitation: the functional adaptation approach (FAA), general stimulating approach (GSA), and process specific approach (PSA). FAA promotes functional performance in a certain living or work environment. This includes the development of environmental manipulation or a compensatory strategy. In this form of approach, neurological impairment itself is not expected to improve. GSA generally uses nonspecific, intellectual tasks such as games or puzzles. It can be easily conducted in any treatment environment. The basic underlying theoretical orientation, however, is not clear. In addition, functional ability to practice real-world-behaviors sometimes fails to improve. In contrast, the purpose of PSA is to restore particular function in one particular cognitive area. Although the positive impact of the treatment is limited to that specific cognitive area, one can expect a secondary improvement of functional performance that has been impaired by the cognitive dysfunction (i.e., little generalizations). For example, improvement of an attentional deficit (specific cognitive dysfunction) can also produce better performance in cooking that had been difficult because of the attention disturbance.

For the present case, the authors practiced both FAA and PSA (visuoperceptual retraining). Even after the 18 months of treatment, visual cognition did not significantly improve. However, through repetitive practice in the community he has been expanding his repertoire of functional behaviours in his social life. During the treatment he increased his self-confidence, self-esteem and ability to cope with his disability. These effects seemed to have considerably improved his QOL. Well preserved intellectual and memory functions may have a positive effect on the learning process.

Perez *et al.* [4] have reported three cases of Balint's syndrome and the individualized rehabilitation approaches of multicontext treatment with intensive verbal cuing and organizational strategies. These patients, however, initially identified objects correctly only 20 to 75% of the time. This finding suggests a coexistence

of visual agnosia that is sometimes accompanied by Balint's syndrome. Although the response accuracy rose to 80 to 95% after 6 to 12 months of rehabilitation, the change possibly resulted from the improvement of visual agnosia rather than impaired visual cognition by Balint's syndrome. Thus, if the patients had not had visual agnosia like our patient, the rehabilitation program could not have produced a significant improvement. In this sense it seems acceptable that rehabilitation produced little effect on visual function in our patient.

Rosselli *et al.* [5] also reported the effects of a neuropsychological treatment on a patient with a fat embolism following a serious traffic accident. The patient showed Balint's syndrome in addition to alexia without agraphia, visual agnosia, prosopagnosia, or memory impairment. Rehabilitative intervention commenced one year after the onset. The treatment protocol was based on PSA and attempted to specifically retrain the impaired visual spatial function. FAA was also developed to improve the adaptive skills of ADL in everyday life. One year after the treatments, he showed an improvement in community independence and was finally able to return to his former job. A significant improvement was also shown in several neuropsychological tests that were sensitive to visual scanning deficits and simultagnosia. Although this may indicate functional recovery of visual impairment, the test-retest learning effects of the tasks cannot be denied because the tasks were also used for the rehabilitation.

The report suggests that a productive life can be attained by a rehabilitative approach even after the period in which the majority of spontaneous recovery is likely to occur. The accumulation of newly learned functional behaviors in a patient's social life with FAA can persist for quite a long period. In this sense FAA is very valuable for improving QOL.

FAA, however, has some disadvantages or limitations. Depending on the behaviors, it takes a long time to establish community independence. Focusing on the practical adaptation of specific behaviors, FAA shows a restricted generalizability.

The present patient could not avoid resigning from his job. In April this year the law for employment promotion of persons with disabilities is revised. The new law gives a wider opportunity for disabled people who have a mentally disabled persons' certificate to get a job. The authors consider that the revision is appropriate and expect the good results in the Japanese welfare situation for the disabled. Unfortunately the double impairment of visual (including optic ataxia) and language was so severe that he could not receive the benefit from the revised law. From the view-point of rehabilitation medicine, social participation is the most important of concerns. In this sense, this patient, despite loosing his job, could acquire various social skills by rehabilitative intervention.

Loss of income is a critical financial problem that should be worked out. For those without psychiatric disease, and with good motor function, official compensation for their financial problems had been hardly obtainable in Japan even if they had great difficulties in their social life because of the higher brain dysfunction, like our patient. Recently, however, the law concerning mental health and welfare for the mentally disabled has been revised and these patients mentioned above have become to be able to apply for a mentally disabled persons' certificate and pension. The present patient finally acquired the qualification for the pension. Although the situation has been somewhat improved, it seems still strange that a patient without any lunacy has a mentally disabled certificate. Legal welfare system specialized for such patient that suffers higher brain dysfunction but no physical and mental disabilities has not yet been established in Japan. Legislation against this problem is a political matter of great urgency.

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