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36. A Rating Sheet to Monitor Apallic Syndrome Patients

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Following emergency therapy of cases with severe brain injury, subsequent neurologic monitoring is most important. The prime goal is to reveal early the symptoms of life-threatening severe brain stem lesions which appear as sequelae of intracranial hematoma or diffuse cerebral edema. It is also important to recognize the development of an apallic symptomatology as well as to monitor its further course, particularly the onset of remission.

Intracranial hematoma as well as diffused brain edema cause mass displacement because of supratentorial increased volume and mass movement followed by tentorial and foraminal herniation with incarceration of midbrain and bulbar brain. Patients with traumatic primary brain stem lesions seldom survive. Usually death occurs at the site of the accident (Peters, 1966; Jellinger, 1966; etc.).

Early recognition of midbrain herniation is important because it is an early sign of supratentorial increased pressure. Continuous monitoring is vital (1) because it is undetermined how the symptoms will arise, (2) because upcoming complications can be recognized in time, and (3) signs of remission will be discovered. Thus, a rating of clinical symptoms is a precondition for the revelation and further course of secondary brain stem damage. This proposition is also applicable to other cerebral pathologic processes such as hypoxic brain damage, brain abscesses, or brain tumors which are accompanied by brain edema, mass movement, incarceration, and release midbrain and/or apallic syndrome.

Since in many intensive care units only non-neurologist surgeons or anesthesiologists are normally present, it will only be possible for them to check and register the decisive clinical criteria of a nascent cerebral complication developing toward an apallic syndrome. The proposed rating sheet is designed to help the on-call doctor of an ICU in doing so.

Based on experience with a large number of patients, criteria of secondary brain stem lesion and of apallic syndrome of other origin can be easily determined and predicted. There is an acute phase as well as a chronic course leading to apallic symptomatology. The following is an example of how to use this rating sheet, outlining the course of one case of brain injury in which a midbrain syndrome occurred followed by an apallic syndrome (Table 1):

An 18-year-old male was admitted to the emergency room of the Surgical Clinic after he had fallen off his motorbike. Results of clinical investigation: unconscious when brought to the hospital, divergent position of eyeballs, narrow equal pupillas, reaction to light diminished. Flexion stretch position of extremities, synergistic flexion stretch cramps to pain stimulation, increased tendon reflexes, positive Babinski sign, increased respiratory rate. Shock stage, fracture of base of skull, angiography of carotid artery N.A.D. – 20 h after accident comatose, stretch synergisms of all extremities, pupillas enlarged, divergent eyeballs, fast respiratory rate (machinelike), increased blood pressure. Two days after trauma increasing stretch synergisms of both extremities and trunk, cramps requiring sedation and controlled ventilation. After 3 days transient spontaneous breathing, but again strong cramps. On the 6th day artificial ventilation again terminated, incipient symptoms of transition stage to traumatic apallic syndrome (stretch synergism diminished, chewing automatisms, snout reflex, respiratory rate increased, etc.). Pulse rate, temperature, and blood pressure increased

Table 1. Sample neurologic rating sheet with typical brain injury case

Patient's name A.L.	age 18 years							I.C.U.		B 200
Time of accident	8/21/68		4.20 p.m.							
Time of check										
Month	VIII			IX				X	II	
Day	21		26	1	4	9	25	5	3	16
Hour	17	20	18	9	9	9	16	9	10	9
Day of hospitalization	1		6	12	15	20	36	46	159	172
I State of consciousness										
A Diminution of vigilance	3	4	4	3	3	3	4	3	3	0
B Special type of disturbance of vigilance	0	0	0	4	3	2	0	2	1	0
II State of reaction										
A Reaction to environment	5	5	5	5	5	5	5	5	5	4
B Reaction to pain stimuli	3	4	4	3	2	2	4	2	2	2
III Optomotoric signs										
A Size of pupilla	2	3	1	0	0	3	1	3	0	0
B Reaction to light	2	3	1	1	1	1	2	1	1	1
C Cilio spinal reflex	2	3	2	1	1	0	1	1	0	0
D Corneal reflex	0	0	0	0	0	0	0	0	0	0
E Position of eyeballs	1	2	1	1	1	1	2	2	1	1
F Deviation of eyeballs	0	0	0	0	0	0	0	0	0	0
G Movement of eyeballs	4	4	3	2	1	1	4	1	1	1
H Oculocephalic reflex	2	3	2	1	1	1	1	1	0	0
IV Chewing and pharyngeal muscles										
A Chewing muscles	1	2	2	2	2	2	2	2	2	1
B Pharyngeal muscles	1	1	1	1	1	1	1	1	1	2
V Motor functions of trunk and extremities										
A Posture	2	5	4	2	2	2	5	2	2	2
B Spontaneous synergisms	3	5	0	0	0	0	5	0	0	0
C Tonus	2	3	2	2	2	2	3	2	2	2
D Tendon reflexes	2	2	2	2	2	2	3	2	2	1
E Pyramid signs	2	2	2	2	2	2	2	2	2	1
VI Autonomous functions										
A Respiration	1	2	1	1	0	0	2	1	0	0
B Temperature	1	2	1	1	1	1	2	0	1	1
C Pulse rate	1	2	1	1	1	1	2	1	0	0
D Blood pressure	1	2	2	2	0	2	2	0	0	0
E Signs of shock	1	0	0	0	0	0	0	0	0	0
VII Primitive pattern										
A Chewing automatism	0	0	2	3	3	3	0	3	2	1
B Snout reflex	0	0	1	2	2	2	0	2	1	1
C Oral fixation mechanism	0	0	0	2	2	2	0	2	1	1
D Chin reflexes	0	0	0	1	2	3	0	2	3	2
E Grasp reflex	0	0	0	3	3	2	0	3	2	2
F Grasp toward something	0	0	0	0	0	0	0	0	0	2
G Postural reflexes	0	0	0	1	2	1	0	1	1	0
H Fixed postural pattern	0	0	0	0	1	1	0	1	1	1
VIII Affection and emotion										
A Affective emotional reaction	3	3	3	3	3	3	3	3	2	2
B Type of affective, emotional disturbance	0	0	0	0	0	0	0	0	5	4
IX Cerebral symptomatology										
A Unilateral	0	0	0	0	11	11	0	11	21	21

On 8th day parasomnic phase. On the 12th day symptoms comparable to akinetic mutism with temporary opening of the eyes, flexion of other extremities, escape reflex of legs, intensified motoric primitive pattern, autonomic functions disinhibit symptoms. Slight signs of left-side hemiparesis. On the 19th day full state of traumatic apallic syndrome with coma vigile, sleep-wake regulation timed by exhaustion, flexion stretch position of all extremities, extensive primitive patterns, posture reflexes, autonomous functions unstable. On the 36th day pneumonia; hours later, again coma. In addition, the remaining symptoms of full state of acute midbrain syndrome with spontaneous stretch synergisms, primitive pattern ceased, again controlled ventilation. Two days later symptoms of transition stage to traumatic apallic syndrome. On the 46th day again the full state of traumatic apallic syndrome. Within the following 4 months, repeated occurrences of pneumonia with subsequent full state of acute midbrain syndrome recurring to full state of traumatic apallic syndrome within several days. After 159 days onset of state of remission, decreasing coma vigile, and day-night sleep-wake regulation, primitive emotional reactions. On the 172nd day optic fixation and following, grasping toward objects decreased, but directed defending movements. After short-lasting regression to full state of traumatic apallic syndrome along with fever and septic condition caused by piodermia fast remission and stabilization. Further remission within the next few months passing through Klüver-Bucy and Korsakoff phases terminating in severe defect stage with brain stem and cerebral symptoms.

The sheet contains nine categories and subgroups. The first six categories deal mainly with acute midbrain complications of cerebral trauma and its remission. The next three categories include the transition stage to chronic brain stem lesion and hemispheric components. The extent of damage within the single categories is expressed by increasing numbers on the score. The increasing or decreasing numbers relate to progressing brain stem lesion or remission respectively. Within some categories, however, we could not stick to the principle of increasing numbers for increasingly grave symptoms. To avoid further diversion but to monitor important data and symptoms, the subgroups for position of eyeballs, swallowing, respiration, and fixed postural pattern–less grave symptoms–had to be given higher numbers.

Within the main symptoms the disposition of the development is not impeded on the sheet. The clinical deterioration within the first six categories can be ascribed to increasing numbers whereas in the additional three categories all scores except for subgroups "affective, emotional" remain zero.

The deterioration of severe clinical symptoms depending on induced sedation appears in increasing scores and has to be marked *M*; *r* for right, *l* for left, *a* for above, and *b* for below should be indicated to reveal the exact location of the symptom.

Summary: A neurologic rating sheet is proposed, which should help particularly nonneurologists to monitor neurologic features and thus reveal upcoming complications in time as well as to discover signs of remission. The sheet is described and outlined along with a typical case of brain injury. However, this monitoring can also be used for midbrain lesion of various etiologies such as hypoxia or edema.

Classification of Symptoms for Neurologic Rating Sheet

I. State of consciousness
A Diminuation of vigilance
0 None, or passed
1 Benumbed
2 Somnolent
3 Soporous
4 Coma

B Special type of disturbance of vigilance
0 None, or passed
1 Coma vigile, sleep-wake regulation timed day-night
2 Coma vigile, sleep-wake regulation timed by exhaustion
3 Short lasting opening of eyes
4 Parasomnic state

II. State of reaction
A Reaction toward environment
0 Normal
1 Talking
2 Obeying to simple commands
3 Turning towards
4 Optic following
5 Missing

B Reaction to painful stimuli
0 Normal
1 Retarded directed defending movement
2 Diminished undirected defending movement
3 Flex-stretch synergism
4 Stretch synergism, all extremities
5 Stretch synergism diminished
6 Missing

III. Optomotoric signs
A Size of pupilla
0 Normal
1 Reduced
2 Narrow
3 Wide (above average)
4 Wide
5 Maximal wide

B Reaction to light
0 Normal
1 Retarded
2 Sluggish
3 Little
4 Missing

C Ciliospinal reflex
0 Normal, not to be released
1 Little
2 Distinctly
3 Diminished
4 Missing

D Corneal reflex
0 Normal
1 Diminished
2 Missing

E Position of eyeballs
0 Normal
1 Slightly divergent
2 Distinctly divergent
3 Convergent

F Deviation of eyeballs
0 None
1 Tendency to deviation
2 Constant deviation
3 Deviation of eyeballs and head
4 Skew deviation

G Movement of eyeballs
0 Normal
1 Saccadic
2 Oscillating
3 Dysconjugated
4 Missing (eyeballs fixed)

H Oculocephalic reflex
0 Normal (not to be released)
1 Can be released weakly
2 Can be released distinctly
3 Diminished
4 Missing (eyeballs fixed)

IV. Chewing and Pharyngeal muscles
A Chewing muscles
0 Normal masseter reflex and tonus
1 Increased masseter reflex and tonus
2 Passing of increased masseter reflex and tonus
3 Missing masseter reflex and tonus

B Pharyngeal muscles
0 Undisturbed swallowing
1 Not checkable
2 Disturbed swallowing

V. Motor functions of trunk and extremiti
A Posture
0 Normal
1 Stretching of lower extremities
2 Flexion of upper, stretching of lower extremities
3 Unilateral flexion with contralateral stretching
4 Stretching of all extremities
5 Stretching of extremities and trunk
6 Diminished stretching
7 Incipient atonic posture
8 Atonic posture

B Spontaneous synergisms
0 None
1 Stereotype trundling and rolling movements
2 Stretching of legs
3 Flexion stretch synergisms
4 Stretch synergisms of all extremities
5 Stretch synergisms of all extremities and trunk
6 Stretch synergisms passing
7 Stretch synergisms passed

C Tonus
0 Normal
1 Increased lower extremities
2 Increased on upper and lower extremiti
3 Tonus decreased
4 Atonic

D Tendon-reflexes
0 Normal
1 Increased
2 Markedly increased
3 Diminished
4 Missing

E Pyramid signs
0 None
1 Can be released little
2 Distinctly

3 Diminished
4 Cannot be released

VI. Autonomous functions
A Respiration
0 Normal
1 Increased rate
2 Machinelike
3 Assisted respiration
4 Gasping
5 No spontaneous respiration

B Temperature
0 Normal
1 Raised
2 Hyperthermia
3 Hyperthermia decreasing
4 Spontaneous hypothermia

Pulse rate
0 Normal
1 Increased
2 Tachycardia
3 Tachycardia decreasing
4 Spontaneous bradycardia

D Blood pressure
0 Normal
1 Lower
2 Raised
3 Hypertensive
4 Passing hypertension
5 Fall in blood pressure

E Signs of shock
0 None
1 Slight
2 Mean
3 Grave

VII. Primitive patterns
A Chewing automatism
0 None
1 Upon stimulation
2 Minor
3 Distinct

B Snout reflex
0 None
1 Released only little
2 Released distinctly

C Oral fixation mechanisms
0 Cannot be released
1 Release optical and upon touch
2 Only upon touch

D Chin reflexes
0 None
1 Released only little
2 Release distinctly
3 Can be released from remote sites

E Grasp reflex
0 None
1 Phasic
2 Tonic and phasic
3 Tonic

F Grasp toward something
0 None
1 Little
2 Distinctly

G Postural reflexes
0 None
1 Little
2 Distinctly

H Fixed postural pattern
0 None
1 Flexion stretch position
2 Magnus-De Kleyn position
3 Flexion of all extremities
4 Stretch of all extremities

VIII. Affection and emotion
A Affective emotional reaction
0 None
1 Decreased
2 Increased
3 Missing

B Special type of affective emotional disturbance
0 None
1 Overshooting joy
2 Excessive crying
3 Excessive anger
4 Primitive fright

IX. Cerebral symptomatology
A Unilateral
0 None
1 Little
2 Distinct

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