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Possible treatment for the Pisa - Syndrome by Parkinson disease.
An case report.

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Abstract.

Objective.
To give an example what can be an good treatment to counter the Pisa-syndrome by persons with the disease of Parkinson.
Method. *To give an overview of the assessment and possible treatment possibilities that are the outcome of that assessment. And an search in the literature to find an way that the shortening of the muscle of the spine is treatable. And place that possibilities in the treatment session but also an attempt to bring this change in the ADL of this person. So that the complaints of him has an possibility to be counter also during the day.*
Results. *The greatest result were there, when he was exercising in the water but there was only an short effect of this on land. Through the hypothesis of the effect in water and the discovery of the dynamic proprioceptive /exteroceptive stimuli was it possible to get an grip on the shortening of the spine on land and not only in the treatment but also on some moments in de ADL. Especially the speech/ eating/swallowing component was improved.*
Conclusion. *One case can never be an significant prove that this approach is working but it has learn us that the shortening of the spine (Pisa –Syndrome) has his roots in an "malfunction" in the brain. That brain is treatable through the right stimuli and will react with an decrease of tone /rigidity but only for an short time and with the possibility to give dynamic stimuli. Further research is necessary to get the treatment for every Parkinson with the Pisa syndrome working.*
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Introduction

Parkinson disease has an very invalidation effect on this people and one of the most different problems is the Pisa syndrome.
Mostly on the most affected side the trunk, often together with the neck, is fixated in an shortening lateroflexion of the whole spine including the cervical spine.
This syndrome is investigated [1]. In their search for an treatment and their investigation was particularly pointed at the effects or side effects of medicine that was given on this people. The individual in this case report with Parkinson was living in an Nursing Home because the invalidation through the Pisa- syndrome make it impossible for him to stay in his own house.

The fall frequency at home was almost 5 - 10 times a day and ask for an 24 hour surveillance to restrict the bad consequences.
Further one there was the bad condition through his problems with swallowing.
When we put him in the Hoehn & Year classification than he was in stage 4.
But there were no sign of mental decrease.

Assessment

This gentlemen was now 73 year old (photo 1) and the disease Parkinson was diagnosed 10 year ago. He was working as an school teacher till his 65 year and the last year it was clear that especially his movement (balance) control was become worse rapidly.
He was not able to speak normal but with low and soundless voice, but the words and content that he spoken were good and correct.
Further one was his memory perfect also of the recent days and years.
His greatest complaint at that point was his behaviour on the table when he was eating and then especially the drooling.
He was aware that his possibilities on the ADL area where minimal and that movement is bed and standing up were difficult and that he often needed assistance, but still the drooling and not able to speak with an good stem volume were his greatest concern.
He walk with an rollator frame but he wasn't capable to walk in an straight line because through the asymmetry of his body, he support not equal on this frame and walk an little bit as an "drunken sailor "- he said. He hasn't an sailor gait but he makes an small adjustment to the right the side where the shortening was present.

What he could

Lying in bed he need when he lie on his back several pillows under his head because his head stay up and came not on the pillow and in bed he could turn to right but not to the left. Only turning to the shortening side was possible on his own (Trunk Control Test [2,3,21] item – 25 points T.C.T. right side and 0-point turning to the left).
Come sit on the edge of the bed was possible over the right side but he need to pull on the blankets to sit and often at the morning this wasn't possible and was assistance necessary. The tone –rigidity- in the morning was high and all symptoms pointed at an freezing moment because of off –stage.
This was not possible to correct with medicine. Come an sit on the other side was possible with assistance but because he couldn't turn to that side, very heavy for him and the staff. (T.C.T max.-12)
Sitting on the edge was possible and no assistance was needed for more than 30 second.

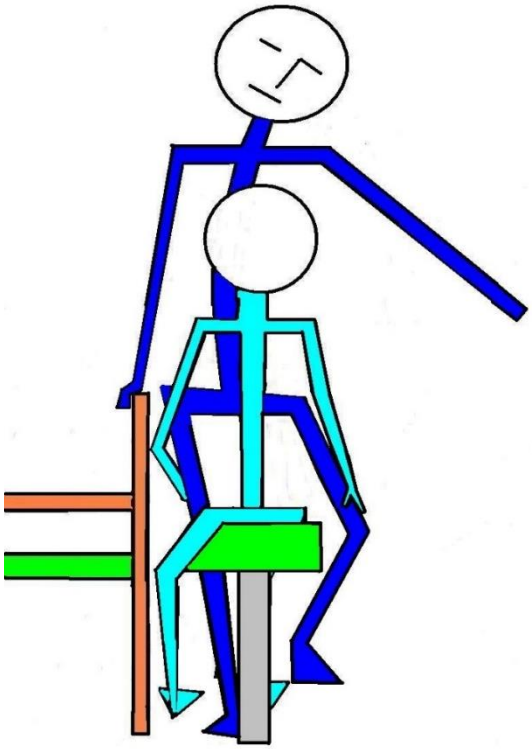
Here he was wash and dressed. The best approach to dressed him was start on the right side in sitting position for the upper body and then stand up and standing behind an chair doing the rest of the ADL.
He was capable to stand up off his own when his bed was placed on an height where his hip stand higher as his knee and with an chair in front of him. He take than the side support of the chair, was capable to do this on his own and also the standing up movement and stand than in balance.
In the beginning he wasn't capable to walk sideway along an table and at the end grasped the rollator frame but this was treated and was after an few mounts possible.
Stair walking under supervision was no problem up and down, in the physical therapy was this his aerobe training part and he was able after an 6 mounts to climb to the 4 floor.

His balance was testing on three different way:

1. By taking off the Berg Balance Scale [2,3].
2. Through an one leg standing test that was modified according the investigation "CRAMP"-investigation (picture 1) [4].
3. Statiek test (picture 3 and 4) [5] what give an complete picture where the difficulty lay with the balance and not only an sign that the balance was poor.

Berg Balance scale was done according the rules but there was an difference when he performed with his right side. Par example reaching with his right arm was, of course less, but also he was faster out of balance. He gave than that he don't feel the point where he must stop. (That could be an perception sign, but [6] has investigated an decrease of dorsal flexion power on one side and spoken also about perception disorder). B.B.S. are 14 items and he scored 30 /56 and the point where balance is in danger was 45. Therefore it is clear that his balance was fragile.
But where and what was the most dangerous point and therefore we look to the items and from item 8 till 14 it was almost never possible with supervision and assistance and here was the rigidity and the Pisa syndrome one of the most important reason for failure.
To get an better –"why"- the one leg standing test was done. This wasn't possible therefore execution on other way. Also to search for the reason why this is so difficult and now we assessed both side, only sideway.
This one leg standing test was more than only an measurement of how long the person was capable to stand on one leg as recorded in the Berg Balance Scale.
Now we can feel what the problems are to get one leg standing test done and in this case ;

1. The rigidity of the spine makes the lengthening on the right side difficult and therefore no movement of the lower trunk [8,9,22] over the right foot. This was on the other side much better.
2. The fear especially on the right side was great and with the chair he could do it and that support was fast lesser, necessary. On the other side he dare to move with his lower trunk over the foot and was fast able to do it with no support.
3. The power in the abductor muscle was very different. The MRC [3,14] was on the left side almost max. but on the right side this was below 4 [3,5] and the pelvis side drop when there was resistance against the left lifting leg. The position of the spine was on the right side always in an shortening position all away till his head.
4. The time that he can stand on one leg was on this way; Left > 15sec. Right not possible with an touch of an finger and then <15 sec.



Picture 1.
Start with the test one leg standing.
He was very afraid to get stand on one leg especially on his right side.
Therefore we make the situation so safe as possible to get him first on one leg and lift the other. Starting with lifting the right leg and then do the same on right standing.
He was permitted to support on an chair on his right side and may lean against the chair with his hip. This was impossible for him because that asked for an lengthening of his spine on the right side.
But with upper trunk sideway (shortening) he was capable to lift his left leg with support.
Than the same lifting with left leg with almost no support on the chair, only one finger and as last an lift of the left leg against resistance to observe what his reaction was in the trunk and to investigated the power of the right abductor muscle [8]. Of course was this also done for the abductor muscle on the other side.
Picture 1. with Permission by J.v.d. Rakt

Picture 1. One leg standing Test.

To complete the balance assessment, the statiek test (picture 3 and 4) [6] but than it is important to know more about the rigidity, selectivity, diagonal and perception.

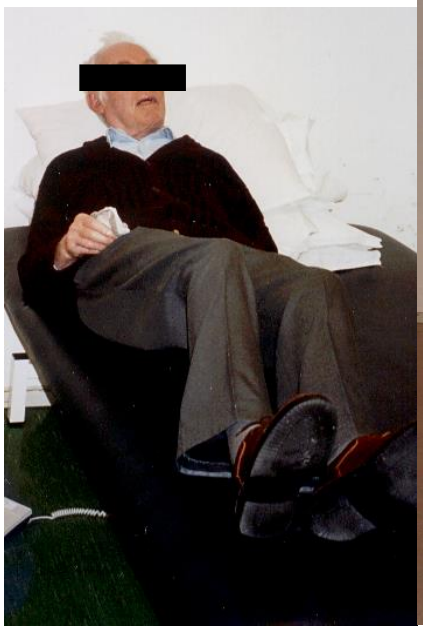


Photo 1

Photo 2

Photo 1 and 2. *Mister P. in the first week of his stay in the Nursing home.*
Lying on the treatment- bench the shortening of his spine is still present. And very clear is the problem how to lose the tone of his body especially in the upper trunk. In the lower trunk the amount of flexion, adduction and endorotation. This can be an sign of an pathological synergy.
On the other photo he walking with his rollator frame and the shortening of the spine is still present and also de deviation of the front wheels to the left. A sign that the support on the rollator frame is not the same left and right.
His legs stand now more in exorotation but still in flexion hip/knee and right has less exorotation as the other side.
Photo 1 and 2. with Permission by J.v.d. Rakt

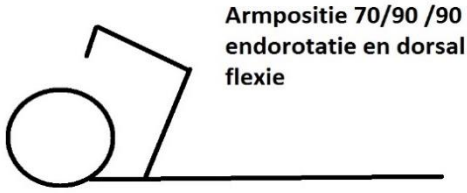
Lying so on the bench, it is clear why turning to the left is so difficult because the tone of his upper trunk is still great.
Further one the attitude of the legs look like an extension synergy and then is there more endorotation with adduction in both legs [10,11,12,13].

Tone, selectivity test, diagonal and power test.

To give an impression of the tone we use the Modified Asworth Scale [16] and that isn't totally right because here had to deal with rigidity and not spasticity. But there isn't an scale to give the degree of rigidity. Sometimes is the MAS-P (an Modified Asworth Scale but develop for Paratonia [17]) an better measurement tool than the official MAS.
But in this case the MAS was used.
The first tone assessment was investigated in lying positon with optimal support of the whole body. No relaxation time because than the difference with sit and stand is often too big. Still the difference will be there and according the literature is that approximately [17] one level in the MAS -scale.
Still movement of the head to the chest was MAS 2. Movement of the shoulder blade to the front give an MAS 2, extension in the elbow was also MAS 2. In the hand was the tone light higher but almost 0-1.
Spine lengthening of the right side MAS 4, but the shortening of the other side was also not possible.
In the hip was movement to extension further MAS 2, exorotation MAS 2 and also abduction. This was right little bit higher than left but still both MAS 2.
Flexion of the knee MAS 1 but extension of the knee was on the end restricted with an high tone MAS 3. Right foot had MAS 2 and left foot MAS 1 for the movement to dorsal flexion.
There where clear tone disturbance and that means that the selectivity is disturbed. And this tone will be higher when he is performed in sitting or standing position.

Selectivity.

In lying position the selectivity was testing through ask him to make the movement with the physical therapist when he placed head, trunk arms or legs to an certain position (this is called Placing) .
Than he must hold this position (Holding and when there is movement in that holding position is that is called Tuning) and when possible resistance can be given in the Holding position[18,19,20]. Two examples of the position of the arm and legs.
Placing of the right arm in this position was difficult and that means that the tone was higher than normal and there was an resistance against this movement especially in shoulder and elbow. Holding was possible without tuning in the wrist and hand an fingers but difficult and with tuning in the shoulder. Resistance was only possible in the hand/wrist part.



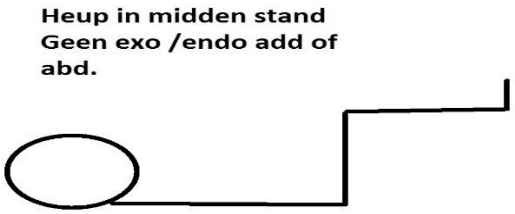


Figure 1. **Placing and holding arm**

Figure 2. Placing and Holding position leg

Figure 1 and 2.
Example of an HOLDING position to investigated how well the selective still is. First from the surface of the bench bring together with the person the arm/leg in this position (placing) than hold still this position (Holding and eventually tuning) and after that resistance against the holding.
Figure 1 and 2 with Permission by J.v.d. Rakt

Strange, because distal it was better than proximal and that was on the right side worse than left. But in both hand there was more selectivity in the hand than in the shoulder and that isn't what we expected. Ask for an further assessment.
Placing of the legs was difficult right more than left because there was an resistance against this movement. Holding was difficult with tuning and still not able to hold the position exactly in the hip with too much exorotation, abduction, in the knee with too much flexion flexion and in the foot was left capable to hold some dorsal flexion but right not. Here the foot stay in plantair flexion.(Figure 1 ,2)
Holding with resistance wasn't possible.
The position is pointed to an flexion synergy with high form of dissociation and that was not possible especially right. Also an test ask for extension in the leg with dorsal flexion wasn't possible. Thus there is in the legs an loss of selectivity and signs that the pathological synergy takes over.

Diagonal assessment

Base assessment done only the lift of an leg and then assess what is happen in the other leg /trunk. That right and left with the emphasis on the power to stabilized the body when one leg is free from the surface [21,22].

Photo 4.

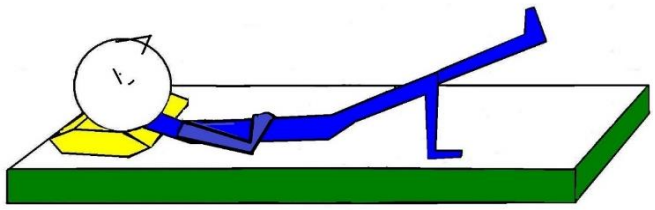
Photo 4.
Lifting the left leg with an weight of 4 kg ask for an stable point in the other leg. That stable point is the heel of the right feet and is an action of the buttock muscle as part of the back diagonal from the right leg to the left shoulder.
Lifting an leg is an action of the front diagonal from the left leg to the right shoulder.
This diagonal are working together to make movement and stability possible and create also in the shoulders and hips an great amount on movement.
The diagonal in action when we walk in the out-phase of arm and legs [22].
Photo 4 with Permission by J.v.d. Rakt

The lift with – in this case first – the left leg ask from the right leg stabilisation and that we can examined on several points.

1. The movement of the foot when the right leg goes in an little abduction that must be counter with exorotation in the right leg .
2. The increase contraction in the buttock muscle on the right.
3. The increase pressure of the heel –right –in the surface of the bench.
4. No plantair flexion may occur in the right foot.
5. Often an tentacle (picture 2) is necessary to get also the power and selectivity good in the picture.

This assessment is done first when his left leg is in the air after that with the right leg is in the air.

A. Left leg in the air give this picture (Photo 4) :
   - Right leg isn't capable to correct the movement of the left leg especially when that is move further in abduction. The exorotation of the right leg is too poor to create an stable base for this movement left.
   - The contraction in the m. gluteus maximus is poor.
   - The heel isn't pushing in the surface on the contrary the leg is more in flexion (hip and knee and in this position there is what pressure on the surface but minimal.
   - There is an very positive plantair flexion, an sign that he must use the extension synergy to control this situation.
   - Tentacle; Lifting van de buttock was no problem but when the left leg goes in the air the extension of the hip was fast decreasing and the upper leg stand not in the mid, move somewhat to endorotation. But he could hold this but not with the hip in good extension.



Picture 2. Tentacle

Picture 2.
The buttock are both of the surface and one leg is lift in the air. This ask for power in one buttock and also for an good selectivity in the hip that carry the weight, because he must control this.
Picture 2. with Permission by J.v.d. Rakt

B. Rigth leg in the air give this picture.
   - Now there was more control as the right move to abduction in comparison with the right leg but still was movement to abduction and adduction very difficult to control.
   - The contraction in the buttock was more as right but still poor.
   - The pushing of the heel was more than on the other side and the left leg remain also in an better extension but…
   - The plantair flexion was also here present.
   - Tentacle: the same as on the other side but an little bit better. Higher and with more control.

Conclusion: The control in the right leg was lesser than left leg and on both side were sign of an extension synergy present.

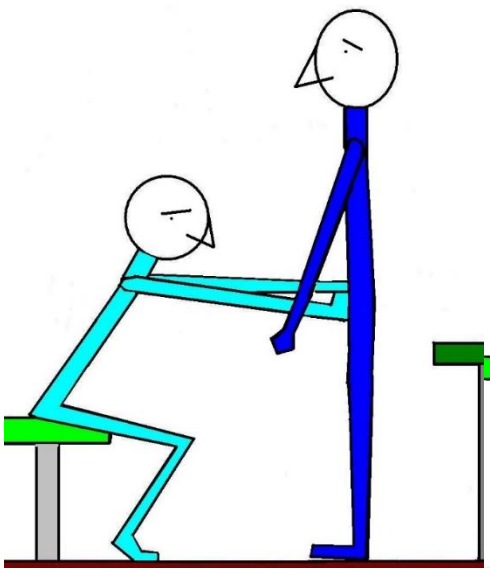
Tone increasing, less selectivity and incomplete diagonals makes movement with the legs difficult and the movement as turning in bed, side movement in bed, coming to sit on the edge , standing up and stand in balance will be difficult . Of course walking also but her he has an aid in the rollator frame to control the weight and the balance with his arms and upper trunk.

Perception.

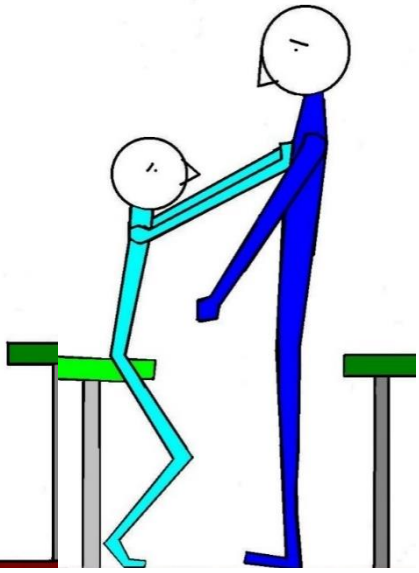
This assessment was done in sitting position because the lying part was heavy for him and it can be done when someone is sitting stable. Assessment especially of the legs and arms and on gnostic sense and discrimination sense .
Proprioceptive test were very difficult because passive movement with no tone wasn't possible through the rigidity. Only in the hand this was possible. When he was asked for an comparison on his feeling what the position was of his leg than was there an increase of tone necessary to do this that the muscle spindles gave the information.
Therefore active proprioceptive sense was possible and there was obvious that the right leg and shoulder/elbow was lesser than the left side.
Especially the right foot was often complete out of his perception.
Gnostic sense was in the arms/hand almost normal.
In the leg was the distal part of the right leg must lesser but also left was lesser than normal.
Both feet had an huge discrimination sense and again right was the worse side.
Testing discrimination sense on the back was there also an different and again right was bad side.
Conclusion: the perception of both legs was lesser but in the right leg was this the most. In comparison with the tone ,selectivity and the diagonal test an clear outcome!

Balance

Statiek test (picture 3 and 4) [5] is an test where the person must react on little pressure. Important is that this reaction is immediately present and according the amount of pressure is given. Further one it is important that the balance reaction in the ankle and hip are present on the right moment and with the right amount of power.



Picture 3. Statiek Hip



Picture 4. Statiek Shoulder

Picture 3 and 4.
This are pictures about the statiek test from the front. Lateral and from the back [5,22]
On hip height is given an light pressure and we feel of the reaction is ;

- *On time*
- *Appropriate*
- *Left and right the same*
- *The reaction of the ankle and hip are symmetrical and on the right moment.*

The same for the test on shoulder height.
Picture 3 and 4 with Permission by J.v.d. Rakt

Outcome

1. *Statiek test on the front, hip height.(picture 3)* He could on the right side very difficult create an resistance and left, it was present, but often not according the pressure. The right foot was late in dorsal flexion and has not the same position than left. Power test of the dorsal flexion was right very bad but also left was the power to little. The movement in the hip occur only in the left hip.
2. *Statiek test on the front, shoulder height.(picture 4)* Again the right shoulder was not able to response on the pressure, left was better but also late. It looks like that the right shoulder must be further to the back before an action was possible. The shortening stay and by rotating the right shoulder to the back he could response on the end of this movement with an movement to the front. Again the right foot was late and he wasn't able to give an good hip reaction. The power of the dorsal flexors of the feet was on the right side very little and left better but still under normal.
3. *Statiek test from the back, hip height.(8,21)* Immediately by an little pull to the front he react, but he react especially in the legs and feet. Both feet are going in plantair flexion and the knee were closer to each other. Her react very fast and with too much power. The power of the plantair flexoren was right not enough and left almost enough in comparison with normal of this age.
4. *Statiek test from the back, shoulder height.(8,21)* Here was the reaction present distal but not in the upper trunk. The whole upper trunk make an flexion in the hip from almost 30°, before there was an reaction and that reaction started left. The shortening was present by both test, no change at all.
5. *Statiek test from lateral right , hip side.(8,21)* The pressure that was given was minimal but the reaction wasn't there. The reaction came from the other leg. What we say by the one leg standing test, always the shortening (upper trunk sideway) and that was his "defensé mechanism".
6. *The same test right but now on shoulder height.(8,21)*Here the reaction was immediately there. But when the pressure changed than was the other leg the base for this reaction
7. *Statiek test on hip and shoulder height lateral left.(8,21)* Here were the reaction almost equal compared with normal and here he was capable also to give the amount of resistance that was asked.

Strength test.

Despite the loss of selectivity and the increase of tone was the MRC – test [3,14] possible. Left was there an decrease in the shoulder, hip and especially the hip extension and the dorsal flexion of the foot. The other muscle were capable to give more than 4. But this in an lying condition and out of pattern.

Right, there were more loss of muscle power, especially the shoulder and shoulder blade to the front, the elbow extension. Further one the hip abduction rotation both and extension, the extension knee and the dorsal-, plantair flexion and in- and eversion.
The power of the head and trunk was difficult to test because through the shortening of the spine was good movement impossible. He could move his head in flexion and extension but always in an shortening position to the right. Lateroflexion and rotation was very difficult and that was equal in the trunk.

Alignment.

Head.
With the technique [23] for the spine cervical and thoracic/ lumbar as traction or replacing an vertebrae an create so an better movement plane was in the cervical spine possible to create what more movement and an correction of the head almost to the mid position. And one of the first reaction was than an good swallowing reaction and the tongue bone was than more relaxed. But when this technique was done in lying position than was the shortening of the neck present on the moment that he makes his first movement.
Investigation of the nerve [24] gave in the head sign that the truncus on the right side had more difficulty to glide optimal.

Shoulder.
Left shoulder almost no problems , only the n. medianus was more tense than normal.
Right shoulder, there was more tense on all three nerves and was it possible to give signs of nerve sensation in his right hand. But this was only when the nerve were set on tense, he never experience this sensation before.

Trunk.
The shortening of the right side was the greatest problem and there was an withdrawn of the upper trunk to the back. This was in the upper trunk more when he moved than when he was resting in supine position, sit and even stand.
His pelvis right was also an little bit to back but very little. Still there were moment that this change in an more withdrawal to the back through pain. Costa-iliacaal syndrome [25] was the reason that started often with pain in the back spine by costa 12, but can also start with pain in his right low stomach.
This complaints were treated with an injection on the Th.12 place and the pain was less but when he had much “tension –tone “ than the pain occur in his stomach.
There was than the taught that this pain give this shortening but regrettable the shortening stay and it is obvious that the shortening has something to do with this complaints.

Hip.
On the right side there was an restriction in the hip movement to exorotation but more important was the positive Lasequé on the right side. There was clear an restriction in the glide possibilities of the nervus ischiadicus.

Knee
No problems

Feet.
Both feet had an restriction in the dorsal flexion but the cause was tone of the calf muscle and with an stretch slow and long was this restore almost to normal. Fast movement gave an faster restriction and that prove the hypothesis that this was an restriction cause through increased tone [26].

Conclusion of this assessment pointed to the Pisa-Syndrome:

The first taught was that this shortening of the spine was cause through an reaction on the pain of the costa-iliacaal syndrome in combination with the Lasequé in the right leg. The pain and discomfort give an increase tone normally but this tone wasn't normal and through the rigidity was this attitude created to get the best attitude with less pain.
But every treatment physical and medicinal drug gave no reaction on the shortening of the spine.
Muscle stretch exercise or neurological inhibition technique give no reaction, only the Mulligan technique gave some movement increase in the neck but only in supine position and that effect was gone when he moved.
His complaint –swallowing – was especially when he walk very great. He stopped with swallowing when he walk and when someone ask him to swallow when he walk, than was this only possible when he stop with walking and concentrated on swallowing. That means that there was an restriction on his capacity and doing of two task together (Stop Walking When Talking S.W.W.T. [3]).
That pointed the cause more to an brain disturbances and that asked for an brain treatment. The stimulus must create in the brain an reaction that makes this shortening not necessary.
Because he was capable to use the treatment of "Cognitive Movement Strategy " [27,28,29]. By "cutting" the action in pieces and ask for an step for step approach learning the Parkinson patient to create an movement without asking him to focus on the whole movement. By using cue's by every step learn an movement as turning on his side in bed and sit on the edge of it and that standing up.
With his cognition our patient was capable to do this but from the beginning was the shortening the problem because through that shortening his wasn't capable to do more movements as before.
The rigidity of the right side stay and his head stay in the same position and the swallowing problem increased because his whole "Brain- Capacity" was needed.
Still on the ward was the approach of cutting the whole movement in pieces and using cue's very positive and he needed less assistance with his movement in and out bed and in and out the chair.
The speech therapist was starting with the L.S.V.T. approach (Lee Silverman Voice Treatment [30]) and an combination of inhibition of the neck and this treatment gave an decrease of the shortening of the neck spine and at that moment an increase in swallowing /eating performance and speech volume.
But again when this was only the speech therapy or only the inhibition treatment than the result wasn't there.
Only an combination gave an positive result during the treatment. The effect was fast gone when or the inhibition or the stimulus of the speech therapist was gone.
And still no reaction in remaining part of the spine, the spine stay on the right side in an shortening position.
This result was only obtain in an sitting position. All other position gave no positive reaction.

Hydrotherapy.

Because of the disappointed reaction and his wish to exercises in water, the treatment was given in the pool of the Nursing home and later on in an group facility in an pool in the next village.
This because there was literature that has reported that exercising in Water has great benefit[31] for the balance postural stability and our familiarity with the Hydrotherapy [32,33] and water specific therapy approach.
The result in the water were fantastic!! For the first time there was an reaction in his whole

spine. In the first week was this on the end of the treatment, but after an session of 4 this reaction occur within the first 10 minutes of the treatment and all what was necessary was moving through the water with great variety of movement direction and position.
Working in supine, sitting and walking condition after 10 minute the shortening was losing and he walking and all movements were much better.
The speech therapist go in the water further with the therapy and that was now easy because the shortening was gone.
We had an result but regrettable that result was obtain in the water and when he was out of the water than the tone was that day less high and the rigidity also but after one day the shortening was back.

Conclusion after the visit in the pool:
We know now that his shortening was changeable. Therefore searching : "What stimulus give the water that wasn't there on land and how can we give that stimulus on land" ?

Hydrotherapy is an treatment that bring us an enriched environment [38]. This is in many publication investigated and the enriched environment is very important to get the best learning result. Learning result on an implicit way and with the differential learning[39] ideas will give the possibilities for the brain to search and find solutions.
Water is an medium that always asked for movement and adaptation and in all direction. The need for an high amount of tone/ rigidity is decreasing and after 10-20 minutes the tone is decreasing therefore it is obvious that the brain has get the message.
Gravity is one of the reason that the tone /rigidity is increasing on land and in this case , this has to do with the "damage "of the brain. But that "damage" brain is capable to adapt when the gravity is lesser and adjust his tone /rigidity and has now more "selectivity".
What makes the brain to open ?
Of course first the decrease of the earth gravity but there is another stimulus that enter the brain and that isn't the case on land.
Research [34,35,36,37] done how the water "enter" the brain and their research give an clear answer that water in movement gives through the hair stimuli to the brain and give so an great amount of information.
The resistance that we feel in water when we go fast but also the resistance when fall in the water is an input that the brain always reach and that is an very important factor.
That makes water to an environment, that is very rich and can change the plasticity of the brain. Or in other word the brain can learn from this information and adapt.
One of greatest investigators of the Parkinson disease has given the answer. Only he know that there was an way into the brain but not how this can be achieve by patient in an severe phase of the disease. The circles (Figure 1)[40,41] developed with Fowler that there are different way to enter the "damage" brain and when this "damage "was severe than there is almost on way possible.
He show this with animals and could find the solution for the greatest damage when only the way through the formation reticularis is possible.
No cognitive escape route and also the other way are blocked but though the Formatio Recutilaris it is possible but that system react on dynamic proprioceptive/exteroceptive stimuli.

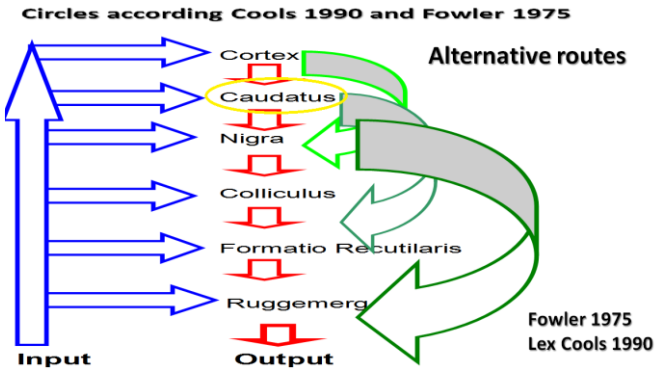


Figure 1.
The input from all systems goes on all levels in the brain and create the output. By the disease Parkinson is the system disturbed at the caudatus/nigra and other way must be found to get an output. That is possible through the Cortex[39,40] or lower through cue's or dynamic stimuli.
Figure 1. The author has permission for publication.

Figure 1 The circles Fowler/Cools/Van de rakt

Hydrotherapy was able to give stimuli that can be use through lower levels as the Nigra nucleus and there was now no problem by Parkinson. But starting on his own starting of movement is still an problem. Water will create an situation that there always an movement situation.
That will not be the case on land and that was also an great problem for our patient.
How to start an movement, because than will the change occur to an dynamic movement and that will give the input that enter the damage brain.

Photo 5 Pisa syndrome

Photo 5. Pisa –syndrome
This is the formation in which the dynamic proprioceptive /exteroceptive stimuli can be created.
The shortening side is placed along an wall that give us the possibility to fill this area with pillow and create an "unhappy" situation.
That stimulus must give an reaction to avoid this "unhappy" stimulus.
In this case we could also do an appeal on the route through the cortex but there will come an time that this isn't possible and then is the "Unhappy "stimulus the only possibility.
We had start this also in the morning to lower down the rigidity and there we placed an hard pillow against the feet on an way that this was disturbing him and he react with an pushing away movement.
That movement give an decrease of the tone/rigidity and makes movements and ADL easier.
Photo 5 . with Permission by J.v.d. Rakt

Starting with normal pillows, we get no reaction and the conclusion was that this wasn't unhappy enough.
The blocks that we after that use were more rigid and give an correction of his total attitude that he find very unpleasing.

Photo 6 **Photo 7**

Photo 6 and 7.
Photo 6 the starting position. And this isn't an good feeling for him,
he has the feeling that he was "throwing" out of the chair.
Photo 7 gives an moment that was there after 20 minutes. An smile and an shortening in his neck and the pillow that was situated on the top was gliding away.
Now he was pushing against the pillow and created on this way an dynamic stimulus. Further one movement is only possible when the tone/rigidity is decreasing. The shortening is there but it is now an active shortening.
Photo 5 . with Permission by J.v.d.Rakt

The choice for this kind of pillows is important.
Not all input must be hard but the most pillow lying on bed are too soft and give no input (figure 4).
This was also the case with the pillow that used in bed.
Soft pillow create an pushing away moment that stopped very fast because the pillow wasn't an obstacle anymore.
The most important aspect is that the stimuli stay dynamic and keep continue informing the brain. All neurological diseases that have an high tone will react on an dynamic stimulus with tone decrease even people with dementia will do so [41,42,43, 4].
There must be an stimulus that give an period that there must be "worked "to get that stimulus away.
Another important aspect is that there must be an reaction on that pushing away. Is the pillow so great and fast that no reaction there is possible than we see that the dynamic stimulus is extinguish [42]. And then the tone is back to the original height.

Photo 8.

Photo 8.
After the 20 minutes the upper block has fallen and an big smile was the result.
But also his voice and swallowing capacity was better and for the treatment better accessible. He react now good on the L.S.V.T. [30].
But the best performance was the standing up movement and the walk after that.
His shortening was eliminated and he standing up was perfect symmetrical and he walk without an aid, but with facilitation with an greater speed through the hall.
He was capable after the walking part to make an shortening to the other side and was than complete free of complaints of the costo-iliacaal syndrome.
But we let him exercise and gave than an rest period and ask him to move to left to hold the spine on the right side so relax as possible.
Again after two hours he feel that his movement was restricted and ask for the pillow to create the dynamic proprioceptive /exteroceptive stimuli again.
Photo 8 with Permission by J.v.d. Rakt

Conclusion is that :

1. Hydrotherapy has an great result and exercising on aerobe and anaerobe was possible with an spine that was in correct fashion. But this effect was gone after an night rest the next day. We need therefore more moment of dynamic stimuli.
2. Starting in the morning was very difficult because than the rigidity was the highest and with medicine was it impossible to correct. But with “hard” pillow against the feet and the active pushing away movement there was an decrease of the tone/rigidity and was training of the transfer and ADL possible.
3. Sitting in an chair was it also possible to get an dynamic stimuli through pushing away with his head/trunk against “hard “pillow.
4. Still all this measures had on limited positive effect. When he go relaxing than the tone /rigidity increase back to the level before.

The question now was;

- How is it possible to give as much dynamic stimuli as possible through the day.
- What are the important moments that must be start with an dynamic stimuli.
- And how much of this moment we need through the day to get an tone decrease in the spine to brake the Pisa- Syndrome. Of course is here an restriction because the disease will go one and the amount on moments must increase and will at the end be insufficient to get the Pisa –syndrome complete under control.

The first attempt was to create an wheelchair orthosis and an chair orthosis in which he was able to create an dynamic stimulus.
Because the moment that he was eating were very important that he sat in an chair and create an dynamic stimulus. That give him the relaxation and after 20 minutes he was able to enjoy his meal or get an treatment for speech and/or eating - swallowing problems.
Another moment was when he had visitors. When he know when someone came , he sat in his chair or wheelchair 20 minutes before to create an good speech performance. And that was working so well that all visitors set him in that wheelchair when she visited him.

He use the wheelchair also when he get to his home and to avoid extinction the orthosis was removable.

Photo 9 .

Photo 9.
His wheelchair with the "pushing – away " orthosis on the right side of the wheelchair . The pillow against his head must have an "unhappy " placing.
And he was capable to initiated on his on, but he admit that the pillow that were "happy" him not stimulated to push away and create an true dynamic stimulus.
Further one is the "On his Own" the most difficult way to get an Parkinson patient in movement.
He know that and was able to think in his head : "I am an football – player " and I push the ball away.
Sometimes people with Parkinson can this but most people need an extern cue to get in action .
Beautiful example is showed in the film Ivan BBC by Johan Miller 1990 [44].
The next photo let see an detail that he mentioned us when he had his relaxation !!
Photo 9 . with Permission by J.v.d. Rakt

Photo 10.

Photo 10.
Special detail look at his right ear !!
He has work so hard that at the end the upper part of his ear is double.
He don't feel now because the tone is normal and there is no pressure on it.
Photo 10 . with Permission by J.v.d. Rakt

Still after an year there were differences that everyone noticed. His capacity was increased, he health was improved. Better eating and swallowing had did his job. His independency in standing up was increased. The morning was still the hardest part but we add that moment to the treatment to get him in the morning in the best scape.
Hydrotherapy at least twice an week and using the chair/wheelchair often 10- 15 times an day makes that he has control over his Pisa –syndrome and his complaints. This was only possible through his increasing condition. (photo 5,6,7,8,9,10,11)
Walking with rollator frame was better but for an short distance . Than the Pisa –syndrome was back not totally but for an great part after 30 meters. He can still walking and swallowing but after 30 meters that was also gone. Sitting in an chair he was able sometimes to reversed this within 10 minutes. When he could do his "football player trick".

But there was another remark of his family that give us the feeling that we had stop and reversed at that point the disease and the Pisa –syndrome.
The family was so happy that they could conversed with their father/man and that he look again as an gentlemen. And when he ask to participated in an course all where there to support him !!

Photo 11.

Photo 11. *Active participating in an course and explain to the course member what he must do to co0ntrol his Pisa syndrome. Here he demonstrated standing up, walking and still able to talk. His family was so proud !*
Photo 11 . with Permission by J.v.d. Rakt

Summary.

Treatment of the Pisa- syndrome is possible by using dynamic proprioceptive/ exteroceptive stimuli and that this must be done in an restricted time area. To long gives an extinction and an increase of the tone /rigidity.
The frequency of the stimulus is almost endless but ask for adaptation through the day and on different location and situation. At the moment that the reaction occur make than this also an moment of treatment multidisciplinary.
The impact of the hydrotherapy was huge and there must more investigation be done to get this therapy an base for the decrease of tone and the Pisa Syndrome.

What in water almost never is needed extra stimuli, is on land the major problem.
How can the patient start with his dynamic movement ?
In the casus was cognitive the possibility to start because he has an “picture “in his head but mostly the start must be done by an cue. And that is when the disease is so far difficult and will end by an stimulus that is “unhappy”[44].
That search is time assuming but will give as result an better control over the Pisa –syndrome and the complaints as pain, balance but also swallowing.
Parkinson is an degenerative illness and the result through the dynamic stimuli were through the time lesser and the amount of “Unhappy-ness ”must be increase. The shortening of the spine was always till the end treatable but the rigidity in the leg in bed was much problematic and asked for adaptation with an total orthosis to inhibit the striker- feet [13].

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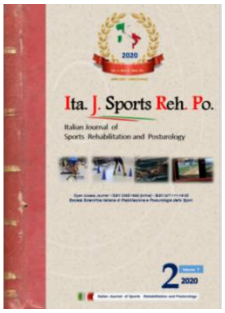

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