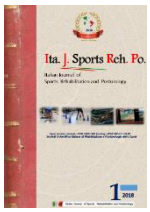

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Diagonals Part six . Standing up and the static reaction

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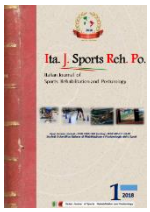

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Abstract

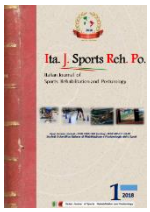
In this part standing up train and learn on other way is the central issue. In part 5 we expressed the difficulty of the low transfer as possibility to get severe stroke individual out of the bed without using the passive elevator, but the low transfer has his limits and to learn an low transfer with extension of the trunk isn't logic. Therefore we search for an solution for an standup movement behind an table or bed with an flexion of the upper trunk and support on the not-affected arm in front of the individual.
That is the solution to go further after the low transfer. Individuals with an severe stroke are able with facilitation to learn this movement and we have than the possibility to train with task-specific resistance treatment. That will improve the coordination and the power of the muscle pattern and stimulated the learning process and that stimulation goes further in the implantation of this standing up exercise in the A.D.L. in their own context. That context is so full of variation and that is the best learning environment that exist. Therefore must this environment and that at home be so good that it increase the possibilities of the individual independency. Train with this three pillars Task-specific resistance treatment , Differential learning and implementation in the A.D.L. are the best guarantee for success. Further in this part ; an explanation why "active" elevator are very dangerous for the developmental or the conservation of what the individual after an stroke has achieve. The active elevator in the A.D.L. can destroy the standing up possibility within an few month totally. The appendix of part 6 goes about the static reactions. Static reaction plays by neurological patient an very important roll and should be known by all team members, that works with neurological patients. Jan van de Rakt, Steve McCarthy-Grunwald Diagonals Part six . Standing up and the static reaction Ita. J. Sports Reh. Po. 2018; 5 ; 2 ; 926 – 989 ISSN 2385-1988 [online] IBSN 007-111-19-55 CGIJ OAJI :0,101

Keywords : Upper trunk forward standing up strategy, diagonals, stroke, task specific resistance therapy.

Diagonals Part six .Pathology
The Stroke patient , how we can train the diagonals to create an better result.

Introduction

Part five stop with the low transfer but the last performance was with an trunk in extension on lumbar level. This is an heavy exercise, and not suitable in combination with the ADL .
It makes the possibilities for the individual to participate in the ADL , washing and clothing not better. And it increase the danger for shoulder complaints. Furthermore especially by elderly is this often an extension that isn't possible anymore and will lead to an lot of time waist. We can of course use load on the low transfer to strengthening the body, but more suitable is to go work on the standing up and stand position as an preparation for the walking wish of the patient and an further stimulation for independency also in the A.D.L. The low transfer with extension of the lower back is nice as an exercise but the standing up possibility is much more important for individual and all caregivers around him.



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We combined the possibilities of the upper trunk flexion to the front with support on the not-affected elbow with an facilitation of this movement and extension of both legs and create an standing up technique that can follow after the low transfers without the need of extension of the trunk.

Stand up and sitting down.

In an old investigation was counting the amount of stand ups, we - normal – make through the day. That is almost 100 times a day and when we look, which strategy we used than is the variation huge. We vary because the environment ask this. Now look to the individual with an stroke and the environment he has. There the variation is very little, because the caregivers created that variation and we have often an environment that will never train the individual for the "great World". Therefore we must try to get on the ward the standup movement with assistance and the stand possibility necessary for ADL, because standing up and sitting down and stand is an very important part of All Day Living (A.D.L.) movement.
But also the ward isn't equal with the environment that people after an stroke will find when they are return to their own home, because all items are design to help the caregiver in doing his job. This we see also occur when the home situation is change and adapt for the individual with an stroke. The most important changes are often for the caregivers to get an good "working place and height"!
An example the toilet. Often the adaptation of this room is that the space is very much increased and suitable for an wheelchair . The individual can now walk on his own but this can "change" in the future. But this futuristic change makes it for an male individual after an stroke impossible to stand for the toilet and urinated. In his old toilet he stand with his shoulder against the wall but that wall is gone and the cannot hold his balance when he is urinated in an standing position because he need his not-affected hand to hold the balance. He therefore must sit down and turn twice without the support of the wall or an railing in front of him. Now all support point are beside him on sit level. The environment is so important and the amount of support points and the place is essential often for the individual to get and hold his independency. Therefore be careful to created beautiful bathrooms/toilets that are easy for the caregivers but dangerous for the individual with an stroke. More about environment influence in this part latter one.

Analyze the normal standing.

Normal standing up is an action of two legs and very often also two arms. We can do it without arms but then we always will use two legs to lift the weight and create an standing balance. The first difference with the standing procedure of an individual after an stroke.
The movement start with an movement from the lower trunk forwards and that is an movement in the hips and when the hip are almost 90 °, we see that the placing of the feet is started and ready before there is weight on it. The second problem of an individual after an stroke because often the selectivity of the affected leg isn't so good that this give not the right foot placement on the affected side and that an standing up with two legs isn't possible.
Furthermore is often an lower trunk forward movement not possible and will there therefore not enough weight (vorlage) be there to get out of the chair.

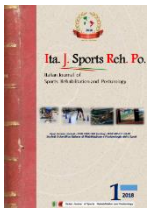

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Photo 1,2,3 and 4. Gives an picture of normal standing up with an lower trunk forward. Start (1) with trunk movement and movement of the legs on the same time to the back. Than the power that is need for the standing up procedure comes in the body especially from the lower trunk/legs and therefore the feet stand now perfect (2.) This is crucial , the feet stand perfect before the weight is on the feet, that is the essence of automatic normal standing up procedure. You can draw an line from the front of the knee to the feet and that will fall for the feet (2) But that will increase in photo 3 , because there must be an last adjustment to get the balance perfect, an movement in the ankle – more dorsal flexion – what we see in an movement of knee further to the front(3). Then the weight is perfect on both feet and is there an good balance and can the standing up be finish through extension of the knee, hip and trunk. (4)

An individual after an stroke with an severe – moderate even sometimes an slight handicap will have problems to do this on this way because;

- He will not have the movement of the trunk (lower trunk forward and movement that occur in the lower trunk and hip and ask for selectivity) together with an good placement of the paretic leg , he must often correct his affected leg. That ask for more cognitive capacity to attend to this position.

– Often he has to little power in his affected leg and then especially in the hip and knee extensors.

– And he has no good balance opportunities in his affected leg .

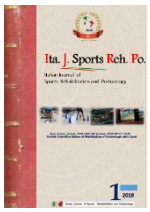
- and often the mobility of his affected ankle is too poor to get the proper adjustment to get the balance perfect. (striker foot)

– Last but not least he cannot used his arm often on the affected side.

The diagonals are interrupted and the concentration for standing up and stand will go to the not-affected side. The most part of the standing up movement will be done by the not-affected arm by pushing on the arm –rest of the chair and that activated the back diagonal in the that arm all away to the affected leg. That will give an lower trunk backward with extension in the affected leg and no good placement of the affected foot but also no “vorlage” of the trunk on the not-affected side to the front.

The not-affected leg will be placed correctly or even further behind but together with the not-affected arm this will often end in an movement far to early total extension and will keep the balance on the backside of the heel and often only on one leg.

That means that we must search for a way to get the affected side more involved in the standing up act and balance in stand. In part 5 we have discussed how to train the “Vorlage “with an upper trunk forward (flexion of the trunk) and parts of the exercises we use now as an base to get the standing up possible and with more involvement of the affected site.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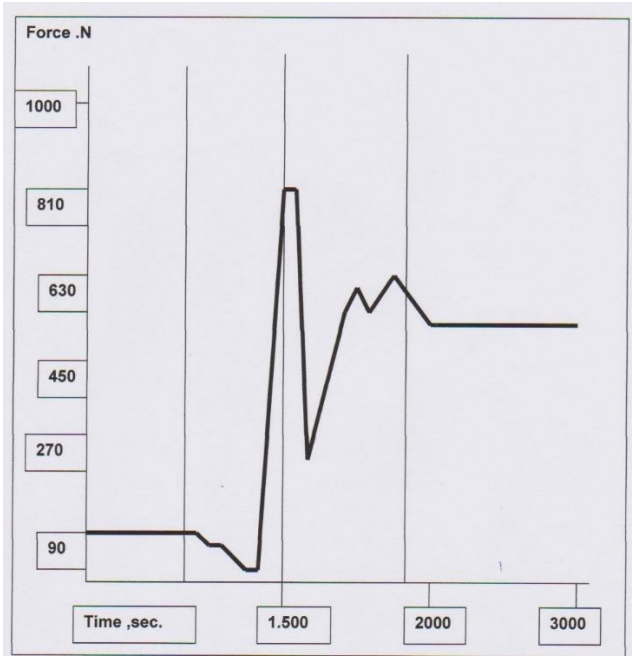


Figure.1
Show how heavy and difficult standing up is. From sitting position we go in standing position in 1 -2 second and that ask for an force of 810.Newton
That means that we must create an balance from sit to stand in 1-2 second and that the legs must have the power to lift our body from sit to stand.
For the hip and knee extensors is calculated that this is about 4 times your weight this muscles must lift. Now you understand why we are so fast to use our arms.

An individual with an stroke must be capable, when his affected leg is not involved in the standing up movement , to do this with one leg and that means that his hip- and knee muscles must now lift **8** times the body-weight. Furthermore standing up with one leg and arm (two points (on the only one side – the unaffected side) makes it very difficult for the individual to stand easy up and stand and keep balance. Therefore every action of the affected leg will make this easier. In an investigation of Rozendal, we see which muscle when and with how many power must act by standing up.
In an investigation of Kniess, we see what arms can help to decrease the heaviness and difficulty. She investigated the reaction by people with an femur fracture when she use the arms to get from sit to stand.

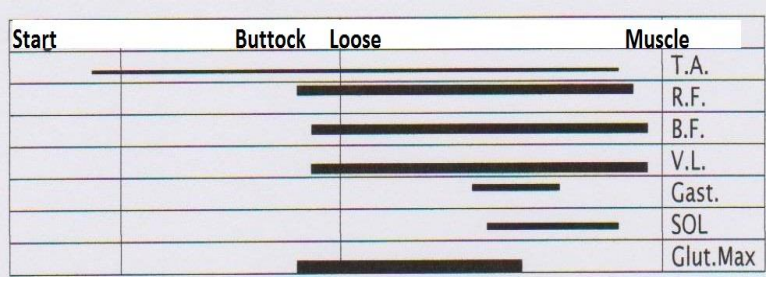
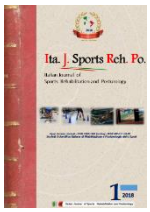


Figure 2.
E.M.G.- data from the muscle (T.A. -Tibialis anterior, R.F. -Rectus femoris, B.F. -Biceps femoris, V.L. -Vastus lateralis, Gast.-Gastronemicus, SOL.- Soleus, Glut.Max.- Gluteus maximus.
We see that the most leg muscles must work from the moment (an little bit for this moment) that the buttock comes free from the surface.
And the buttock muscle must works at his top on that moment from all muscles. The foot muscle with exception of the Tibialis anterior must work on the end of the standing up procedure and make an stable balance.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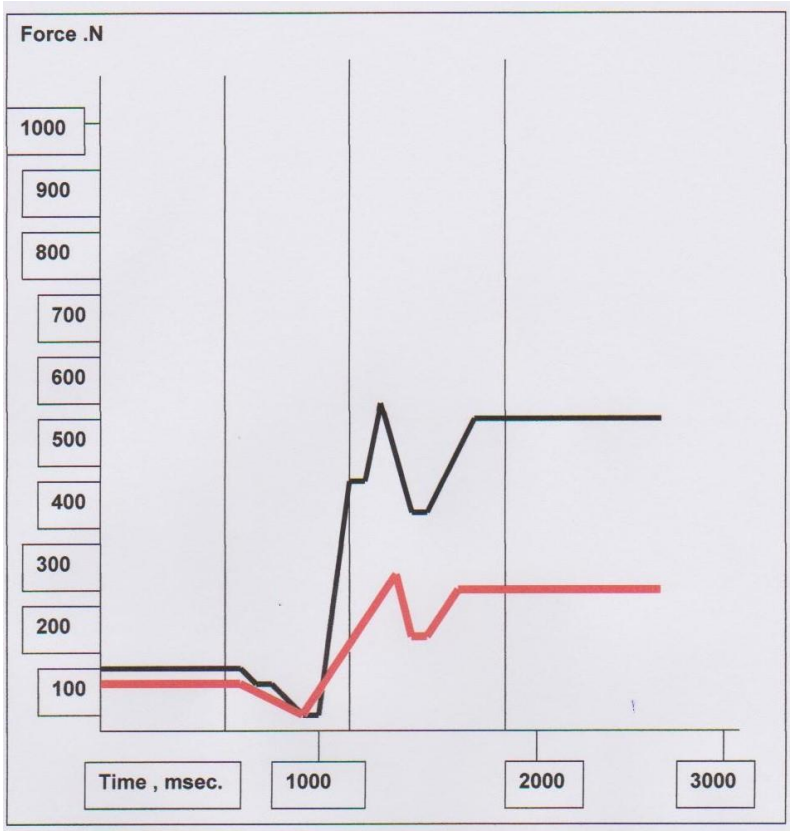

Figure 3.
This figure you must compare with figure 1.
The time and the power scale are the same.
The red line is the affected (after fracture) leg and black the other. Both arms are involved in the standing procedure .
First the power that is needed to stand up without the arms will never reach. The good leg comes now under the 600 Newton and without arms that was 810 N. The leg that was recovered of an femur fracture stay below 300 newton. And the time between sit and stand is longer.

Arms involvement will reduce the amount of power that is needed to stand up, but there is another difference that is very important. The time that is needed to get up is greater and therefore is the time to create an balance longer because we have more points of support. Or with this support on the arms there is more time needed to get an good balance, because the support is not in the front but on side of the chair (see photo 4a)
An conclusion from the investigation of Kniess and the co-workers was :
That strengthening of the muscles of the affected leg wasn't possible because the amount of force –intensity- was to low and even with repetition this leg don't be fatigue and will not have an stimulus to increase in power and coordination.

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Photo 4a.
The position of the people that where investigated in the investigation of Kniess (figure 3).
This photo let us see ;

1. The affected leg on the right side is flat. That is an sign that the tone of the muscle around the hip is less and that has also his influence on the coordination and the power.
2. Second element is that placing the hands on this way will not lead automatic to an good placement of both feet (see photo 1-4). Now she must make an vorlage with the hand on the support and place the feet correctly. Than will the support on the arm be great but the movement she makes is often an upper trunk backward. The standing procedure is less heavy but the creation of the balance in stand is difficult.

Figure 3 and the Photo 4a,4b and 4c gives not an real picture of an individual with an stroke because in both cases the people use two arms and legs. But the figures gives an indication what the individual after an stroke must use with his not-affected arm to get up. That makes it very important when we go train this and how we incorporated this in their environment and in the ADL.
An first example is the choice of the chair, sitting part equal and (see part 5) the height of the chair. In all Dutch rehabilitation centre, but also abroad and in rehabilitation department of nursing homes I see people moving herself in an wheelchair with the not-affected leg. Often the affected leg lay on an support that is up because otherwise he cannot manage the obstacles. That means that the trunk/pelvis must rotated back in an lumbar flexion because the extension in the affected leg ask for an adjustment in the hip and lumbar spine. This will give an thorax collapse and an cervical extension that can influenced the possibility of the muscles involved by the swallowing procedure. But the worse thing is that the patient need assistance to get out of the wheelchair and we want him to be independent so soon as possible. Now he is independent in the wheelchair riding but loss his possibility to stand up and walk. Because the wheelchair is to low and the power of one leg isn't enough to get alone out this low wheelchair.

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Photo 4 b and 4 c.
The same situation as on photo 4 a but now we see that the power in the arms lead to an situation that the upper trunk is too far to the back and that he stay out of balance and is not capable to restore this balance.
The sign that he is out of balance are the two fore foot that are in the air. And that is present on both photos. That means that he start out of balance and make the standing procedure without the possibility to transfer the weight on one leg and place the other further back and create an balance.
This end with an fall back in the chair or asking for help or the chair will slip to the back and now it is very dangerous. And he isn't independent anymore !!
Further look to the construction of the chair !
Is the height good , knee lower than the hip joint and never the back of the sitting part lower than the front. This is not the case and will make it difficult for him to get good on the front of the chair. On this photo he stand against the edge of the chair and pushed with his leg immediately the chair to the back and makes an creation of the balance much more difficult.
Again the placing of the feet isn't correct because the movement of the trunk over the hip isn't complete.
This illustrated the influence of the environment on the movement possibilities to hold the independency.
And when this individual had an stroke he must do this with one hand and leg !!

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Photo 5.
Individual with an moderate stroke with the affected side right.
Sitting in an low chair with the affected leg support up and with bottom of the wheelchair that is soft. We discover that she was not capable to standup out of this chair.
But after giving her another wheelchair (photo 6) her standing up was independent furthermore here walking was better and she has no complaint about here affected knee.
Further she was capable of drive this wheelchair.
This was too heavy to the front and she did it backward.
Through the extension of the affected leg the pelvis is rotated to the back and that makes it difficult to get enough power in the not-affected leg for the flexion in the knee and especially in the hip.
Therefore she turn the wheelchair and push the wheelchair through the room and corridor with extension.

Their complain was knee pain on the inside of the knee after sitting in the wheelchair and that make it hard to start with walking. Through the extension synergy there was, when she sit and much more when she drive, an movement of the whole leg to endorotation and adduction. That movement was braced by heel bake, but that created an force on the medial and lateral part of her affected knee and that has an negative effect on here walking capacity, especially the start. Standing up out this wheelchair wasn't possible without assistance. The force that she had in the not-affected leg and not-affected arm with the possibilities in the affected leg was to little even with the right technique to get to an standing position without assistance. The soft bottom of the wheelchair makes things worse. The legs will turn more in adduction and endorotation and that stimulated the pelvis rotation to the back and the extensor synergy in the affected leg and makes the force on her affected knee greater.

That means that when she sit in an wheelchair that makes standing up on their own impossible and decrease her walking capacity, instead improve it !

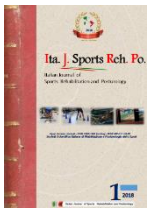
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Photo 6.
We change the wheelchair and give her an wheelchair that was ;

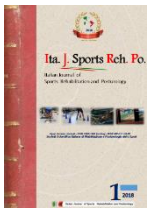
1. Higher, now the knee was always lower than the hip.
2. The sitting part of the wheelchair was now robust and that will prevent the legs for endorotation and adduction.
3. The foot plate that support the affected leg was now placed that the foot stand almost under the knee. The deviation in the knee disappear and she was able to push with here affected leg on the footplate to hold their sitting position under control or changed it.
4. Standing up is now possible with support of the not-affected arm with the assistance of an table in front of here and she can drive the wheelchair with her not-affected hand and leg forwards. But this was more difficult as in the other wheelchair.
5. And there was no pain in the knee anymore.

We have this investigation with this two type of wheelchair done by 8 patient and after two hours sitting and driving we have examine two elements;

1. We have done the Up and Go test starting from an normal chair.
   2. Have measure the angle of the knee.

The conclusion was that people sitting in wheelchair Photo 5 had more steps and time needing to do the Up and Go test and that the angle of the knee in wheelchair (photo 5) was always on the medial side 2°- 10° greater. That means that this chair makes standing up and walking almost impossible and affects the affected knee. Look out for this type of wheelchair and be aware that sitting in an low chair makes driving easy but standing up and sitting difficult. And be aware that knee get into trouble !!!

Vorlage.
In photo 6 this lady was capable to stand up on their own with the assistance of an table in front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of their. In the low transfer we train and have done this transfer in the ADL , thus will the individual be able to perform an Vorlage, but now we go further than only an little lift of the buttock , now we want end in an standing position. We start with an chair that is of an good height, knee lower than the hip. And placed the individual for an table or bench.

Photo 7

Vorlage training to learn to take support on the table and feel that the possibility to stretch the leg is better now. Observe how far the feet stand behind the knee and that the heel is of the ground , this we use later to give an good facilitation on the affected leg. Most stroke individuals are able to do this with one arm. On this photo the elbow are bended in front of the body but he can also take the edge of the table and pull **but the elbow stay on the table** (photo 9). The affected arm can stay on the table with an little control of the not-affected arm but when that isn't possible than in front of the body.

Support on an table or bench in the front will created an movement and an balance that makes standing up and standing in balance easier .
And the learning and task specific resistance treatment, even ADL, is better possible without the danger that we learn an negative perception of the body with an great deviation to the not-affected side.
Standing up always with the not-affected leg and arm (on the side rest of the chair) will teach the individual that there is the power. That is correct but the influence of the affected side is minimal and because the upper trunk is always backward the affected leg will never stand on the right place.
Therefore when we going to train and practice the right movement than must we search for an movement that created an inhibition of this upper trunk backward and also the lower trunk backward with an extensor synergy.
That is the movement when people go so far to the front and take support on an table with the elbow bended and with support on it.

1. That will asked for an upper trunk forward that will move the trunk over the hip and create the movement that is normal when we want to stand up. The not-affected side will response with an perfect placing of the foot behind the knee but often the affected leg go also in much more flexion in hip and knee because this movement of the upper trunk inhibits the extensor synergy.
2. The support on the table must be an real one , otherwise the upper trunk forward will not occur as wanted and the reaction of the legs will be less. That means that individuals with an stroke must learn that support taken and that can be learn by placing this people on normal table when they are eating or make their meal.

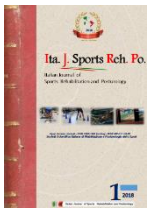

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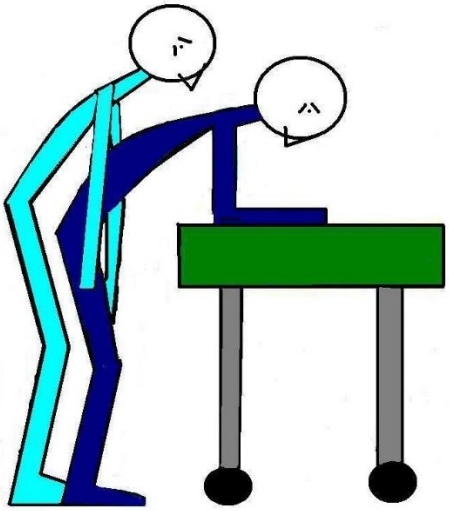
Photo 7a.
Exercise in making an sandwiches with the assistance of the therapist on the affected side .
In this case the support is giving on the elbow on the affected side but the effect is that both legs are standing symmetrical under the chair with the heel even an little bit of the floor.
This attitude is created by an upper trunk forward and now the flexion in lower trunk/ legs is necessary to stabilized the whole body.

This activity of this stroke survivor on an normal table with support on the table will created by this person an automatic movement of the upper trunk but also of the lower trunk and will make standing up in balance easier but it asked for an environment in which he can do this.

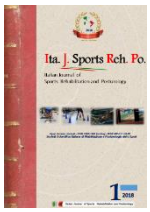
3. After sitting on this table he will often have too much support to the front that heels are free and when he will train the standing up movement, he can started with pushing his heels in the floor, but with holding the support on the table. This will give an action of the leg muscle that is equal with standing up and also pushing away the chair. Facilitation will be very effective when we give an push on the knee in the direction of the "free" heel.
4. In this position it is what difficult to stretch the legs totally, but that is in the start of the treatment very important before the individual leave the elbow support.

We know how important it is to get up out the chair and stay in standing position in balance that this is one of the first exercise that will be exercised when the low transfer is too easy and we search than for two goals;

A. Created an task specific resistance treatment in which the affected leg has an great part of the standing procedure
B. Search for an way that this can be done on the ward or at home with an good assistance or even without .



Picture 1.
We want to learn the individual which movement he must make and we use an facilitation technique that makes this possible.
Facilitation: The caregiver push the upper trunk to the front, increasing the "Vorlage " and pushed the knee in the direction of the heel to stimulated the extension of the affected knee.
But what must the individual do !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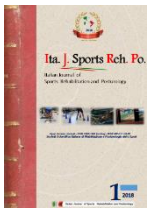
The movement that the individual must make is ;

1. Reach so far as possible on the table or in picture 1 an bed or an bench. On the bed this movement can be the best performed on the feet end. There is in the middle often an support for the matrass. There must the individual hold his hand and the height must be so that he can easy support on the elbow. On this moment the vorlage is complete and that means that the automatic leg movement must be there otherwise is correction needed.
2. Than the individual may pull on the “matrass-support (but the elbow remain on the surface with support) and on the same time push his heels in the floor. That will stimulated the standing up movement. And the facilitation makes this movement – upper trunk to the front and extension knees better possible

Therefore facilitation is an stimulation of the movement and “power explosion” of the muscles. Therefore our hands lies ;
A- One on the upper affected leg just above the knee and we push this knee down and that will bring the heel on the floor and gives the individual the feeling of extension in the knee.
B- The other arm goes to the not –affected side to hold the individual optimal in the center or when we can ask more of the affected leg, than pull him more on the affected leg. But this arm does more, the shoulder of the therapist is placed against the shoulder blade of the patients and makes an movement to the front and facilitated the upper trunk forward.(photo 8)
Now the patient stand with the knee in extension and the upper trunk in flexion support on the elbow. The balance must be good, but by using an table the balance is much more to the front and will be firm and then we can asked to make more extension in the hips and trunk.

Photo 8.
The position of the shoulder of the therapist in facilitating the “Vorlage” of the individual to the front-upper trunk forward with the eyes of both looking to the table. **Never** ask for an extension because than the individual with an stroke will always starting with his head make an upper trunk backward (activation of the back diagonal). The extension must first come from the leg and the head is the last joint that goes in extension. The hand lies on the not-affected side and can create the best possible weight bearing on the affected leg. Together with the push on the affected knee an perfect stimulation and with load on the affected leg.
Pulling with the unaffected arm is good but always **with an bended and supported elbow** than the “Vorlage” will we good . The elbow stay bended till the knee are straight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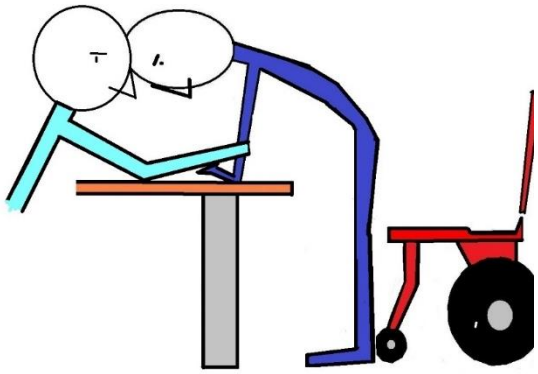
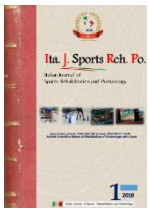
Often the last part of the knee extension is difficult. And it is important to achieve optimal extension in the knee to get the best position for the balance. The last part must be stimulated and the extension must be there in both legs.
Now there are an lot of possibility's to make from this movement an task-specific resistance treatment with an learning aspect and an training of the coordination and power.
We used the diagonal support on the unaffected side to the affected leg and we know that the angle to get the best diagonal is not good, but we can change that when the power increased.
And we can search for an possibility to bring it in the ADL of every day on the ward and then is standing up important but stand and get washed and dressed more important for individual and all caregivers.
First, increasing the coordination and power of the standing up movement and stand position. When we facilitated, we feel how may assistance an patient need. When that assistance is not there the movement cannot be done by the individual, therefore we can calculated how many support is needing to create an R.M. of 75 % and we can exercise this 10 times behind each other and create an muscle fatigue (3 session of 10, 2-3 times a week). Or we can change the height of the chair and create so the possibility that the patient can do it without assistance and then we can pull the weight more on the affected leg and create an better diagonal angle. We can change the table and take a bench or an bed. Than the support area is different and will the reaction with elbow on, be changed. But very important is, do it with (Toine van der Goolberg) "overload", make it difficult and heavy the muscle but also the brain must work.

Increasing the power in standing position.

To hold this standing position with support on the elbow and optimal extension in the knee is now possible, but is it also possible when we pull or push on the elbow. Push or pull on the not-affected elbow gives an reaction in the all diagonals and of course will the reaction not be perfect, but that is often not possible in this stage of rehabilitation.



Picture2.
Chain and diagonal .
Of all chain will work is depended of the support possibilities of the affected arm on the elbow. This is an isometric contraction that means no change of muscle length but the tone of the muscle pattern will increased.
To hold this position for an longer period that more tone and power (coordination and muscle power) is needed. In the ADL more time is needed for stability and an better balance.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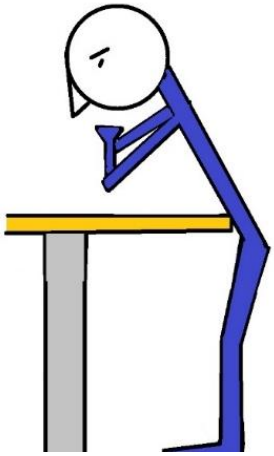
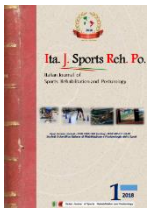
Is the support on the elbow is on both side present. Of course will the support on the affected be lesser but there we give an minor pull or push intervention. The patient must hold his elbow on the bench/table or bed and when we pull on the upper arm to the therapist, we try to get close to his repetition maximum (R.M. 90% thus with 4 of 5 rehearsal). Now The individual must make in the arms/shoulder an retroflexion and retraction (back diagonal upper part) but also the front diagonal in both legs to hold the flexion in the hip and extension in the hip/ knee and hold the feet flat on the floor. All this signs determined how heavy it is, and is this his maximum. The chain between the arm and legs , the diagonals and both the homolateral structure must work to get the job done.(6 chains). When the affected arm cannot give an resistance than we will see 3 chain, between both legs, the diagonal from the not-affected arm to the affected leg and the homolateral structure on the not-affected side. Now we push the upper arms to the patient, his answer must we anteflexion with protraction(the m. serratus anterior) and the stomach muscle must work, but also the hip flexors /extensors and knee extensors and he must hold his feet flat on the floor. The R.M. is on his max. and 4-5 rehearsal and we can varied by quit change in the pull and push direction. The last exercise (picture 3) must give an concentric contraction of the m.gluteus maximus, the keystone of the dorsal diagonal and start with no load extra, this is needed to get more coordination and power in this part of the dorsal diagonals.



Picture 3.
Concentric contraction of the m. gluteus maximus the keystone of the dorsal diagonal . To get an good stability you can start with the elbow on the bench and the stomach against the edge of the bench. Be sure that knee are right and that feet are flat on the floor and now ask to lift the elbow from the bench but the stomach must stay against it. Is this almost or just possible, you can use an back splint (knee) , or help, but that is the R.M. 100%. But very often will this be possible after an few times with little effort than give load to get an good R.M. in this task-specific resistance treatment and we have an concentric contraction of the buttock muscle.

The extinction reaction can makes this exercises difficult. To copy with this phenomena we can create more movement in the upper trunk. Support on the bench and then again up or the same trunk movement but with an different placing of the feet .
But when we want to create an task-specific resistance treatment and the danger of extinction is present give the affected knee an back splint that fixated total or only an little the knee, now we can use the muscle spindles to create through the muscle an feeling that can decrease the extinction phenomena. In the part about the pusher we will use this back splint very often and that is very important to create an perception that can alter the possibilities for this individuals with that type of an stroke !!



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A.D.L.

When individuals have this ability, it is time to make the shift to the A.D.L. and let the individual use the new ability in his context. That means that the individual know what he must do and this can with facilitation and the nurses know how to facilitated and how much.
The importance of this implementation is so big, that the present of the therapist on the ward every day is very important. Now he can teach the individual and the nurse to get which little changes the optimal result and create an situation in which the individual with an stroke can make with everyone this stand-up and stand exercises and we create amount of exercises that is phenomenal !

The individual after an stroke was not able to stand after going to the toilet. And that means that cleaning and dressing must be done in bed. That means that the individual must go back to bed with an elevator or an low transfer. This is now not necessary because we create an situation that he can stand up and stand and can after the cleaning and dressing in the wheelchair and can go further. **But there must be structure in this increasing of his ability's.**

When he can stand-up and stand supporting on his elbow that means going to an normal toilet isn't possible, because he must then stand and turn.

That last one isn't possible thus we make use of the bed on the ward and use an toilet - wheelchair.

The bed we can set on the right height and we must take an toilet-wheelchair , that has the right height. (hip higher than the knee)

But they are individuals that cannot defecated well without foot support and then the toilet chair must can lower. And higher when the patient is standing up , otherwise it is an to great effort for the individual. Here we needed therefore toilet - wheelchair that are in high adjustable because we choose this training pad to create an standing up movement and stand position that can do the individual latter on his own.

Of course will an great part of the individual with an stroke latter on going over on another strategy of standing up and stand but be aware that an great group of stroke survivors will need this strategy to get out of the chair, wheelchair , toilet , douche or bed.

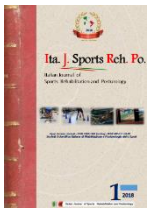
And then it is sad to see that very often the adaptations in rehabilitation center, nursing home department for rehabilitation , long care living facilities but also in their home , are not present to get up and stand with this standing up strategy.

In the rehabilitation institution it looks like the space must be there for the nurses and other care givers and never will there be an table in front for the individual with stroke be realized.

Even for the standing up (electric) chair there may never stand an table because that space is for the rollator frame.

And an rollator frame will be never an good assistance for an standing up movement what the table can do very well. And this table will give in the beginning an good balance and the opportunity to walk along the table. The equipment of all this institution must be directed to the individual with an stroke , how he or she can perform independent so soon as possible and can work on an higher level.

How we can facilitated the standing position and make this an standing position that can hold sometime.



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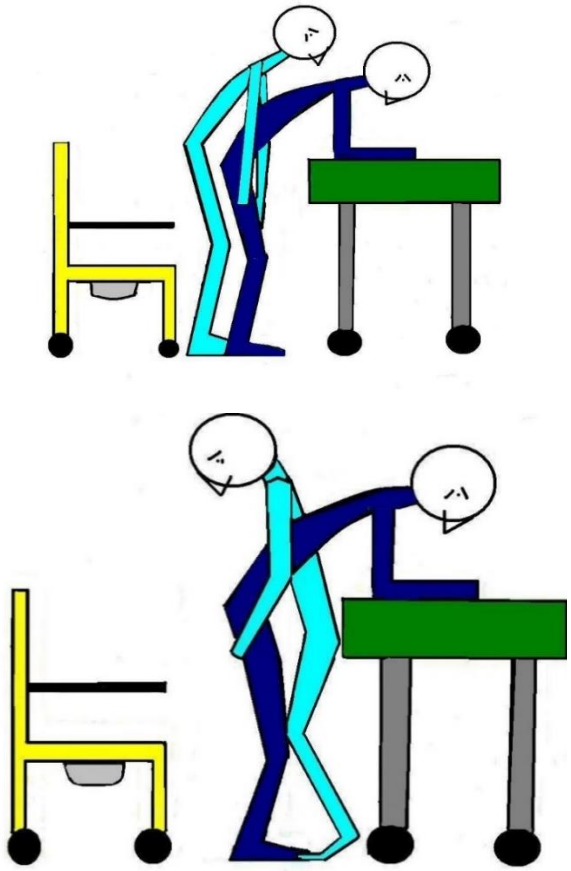


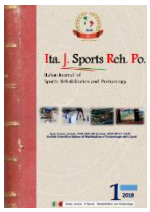
Picture 4 and 5.
With facilitation stand up and stay in the standing position with facilitation.
On the ward of the nursing home this technique will be done by the nurse when the patient must go to the toilet.
Only we take an toilet – wheelchair, because this individual can now learned and exercise standing up and stand, not turn or walk .
The standing up procedure is the same :
The feet in the right position , an upper trunk forward on the bed with support on the elbow and then facilitation through the pressure on the knee and the movement of shoulder of the therapist against the shoulder of the individual to the front. Special attention on the knee , be sure that this in his optimal extension.

Now makes the nurse an move and take another position.
But we aware that this is exercised before, through the therapist and can also be used as an Task specific resistance exercise.

The nurse (this movement is known by the individual, because it is train on the therapy ward and on the department were the patient stay) placed his knee in front of the affected knee and turn here body and goes over the patient and hold the trunk with their upper arm .
The first attempts always do it with two persons but when the individual after an stroke and the nurse has confidence, this can be done through one person. The fixation of the knee and the upper arm is enough and the nurse has two hands free.
This can also be done after an shower , or when an patient has pain on his buttock. Be aware that when someone can do this, he knows why he must stand so long and will be more motivated to do this and that means that we will see an increase on standing power through this technique in the ADL and this will increase his ability to improve but also improve the possibilities of his affected side.

Many therapist and nurses ask the individual to “stretch”. Be carefully this individual cannot stretch in the lower trunk and will thus make an upper trunk backward and that can give an movement too far to the back. **Always pay attention that the individual look downward.**

The individual will ask for an fixed point that give more safety, that is possible but only when the **elbow** is supporting on the bed, bench or table.
Without the support on the surface every pull to get stand up gives an upper trunk backward and **activated** the back diagonal to much!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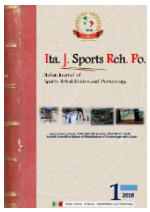
Only when the elbow is bending and supporting, will give an pull with the not-affected arm/hand an upper trunk forward, an front diagonal activity !!!

The next step in the rehabilitation will be turn in the position with support for the bed/table and bench and how difficult is that and how important is the upper trunk forward again !!

Photo 9.
An example of an individual that has create an possibility to stand up on the table with elbow supporting pull. An lady with an stroke on the left side.
This happen before the therapist has train the standing up movement on the ward in the context of every day. Sometimes there is an generalization that is faster as we think.
But this lady had an perfect reason , their buttock hurts and the experience she had that when she stand up on this way the pain was gone immediately . Noticed the stand of the knee , when standing up on this way the extension of the knee will almost never be complete because (one of the reason) so many weight lies on the arm. Therefore teach and train this individual to extend the knee so far as possible and the next step is to stretch out and come in an position that only the hand support on the table. But keep an upper trunk forward !!

The transfer of individual who can do this in the ADL is now no longer an low transfer. Very important because this milestone is often an possibility to get in and out in an car and visited others more frequently. But be aware that that transfer in and out an car is very important for learning and training standing up and turn.
Because this people can now move with an more power, but the step to the next achievement is out this position turn of minimal 90°.
Unfortunately we see transfer- tools that are be used to increase the speed of the work on the ward. This will never be important for the rehabilitation of the individual (Nielsen). Regrettable there are almost no investigation that have investigated what the effect are of the use of this transfer- tools. In practice we see almost never an recovery of the individual by using that transfer-tools , the opposite we have seen that the possibilities of the patient fast decreased.



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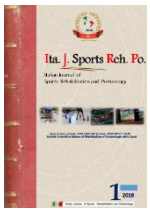
Turning, standing for the bed ask for an replacement of the legs, the first steps. By individual with an stroke is turning, supporting on the not-affected arm the easy way. Turning the other way means losing the support of the not-affected arm.
Still is this one of the most fearful moment when the affected leg must go to the back because now there is no diagonal only the homolateral structure on the not-affected side. But with the not-affected side stand against the bed, this will be the safest way to do it , thus we go to train/learn it.
And we have an bending upper trunk , thus the affected leg goes ……easier to the back!

The next step must be therefore an learning program that makes it possible that the patient knows and can :

1. Standing up from all chairs especially chair that are lower and different.
2. Standing up and stand without a support of a bed because than there are more possibilities for the patients to stand up and stand in different places and situation.
3. Start with making in stand movements that makes the transfers easy and the first independency will be created. And the movement that are very important now are turning movement , walk backwards and walk side wards. Not walking forward that is important for the individual but on the ward and the ADL is backward, sideways walking and turning the most important walking movement that the individual must master.

Again we start with learning how to do this movement, than make it to an task-specific resistance treatment to build up more coordination and power and when there is an good base the movement will be incorporated in the ADL.
The variation can now also involved the standing up movement.
You can now make the standing up movement with an load or of an lower chair or without the support on the front. And even an total new strategy can be possible and then the standing is almost normal; " Not an upper trunk forward but more to an lower trunk forward ".
Upper trunk forward gives an flexion of the trunk with an protraction of the shoulder blade and the "vorlage" is enough (sitting on an chair that create that hips are higher than the knee) and that makes extension of the knee easy. Lower trunk Forward create an extension in the trunk what gives an retraction of the shoulder blade, that gives not enough "vorlage" but well the best posture that will give the best flexion in the hip and knee. But there must be an movement in the ankle joint to create the best distribution of the body weight.
Only a few individuals with stroke will do this movement perfect, most individual will have great difficulties to get the affected leg in the wright position. When that is not possible the weight bearing will be done by the not-affected leg and when that leg is not so powerful to do this with the help of the not-affected arm. That means that when the using of the affected leg is very little, that this will be never an real "ADL movement". We choice than for the upper trunk forward strategy and the lower trunk forward only as an variation in the training program. But that's only possible when the environment is so that this strategy is everywhere possible !



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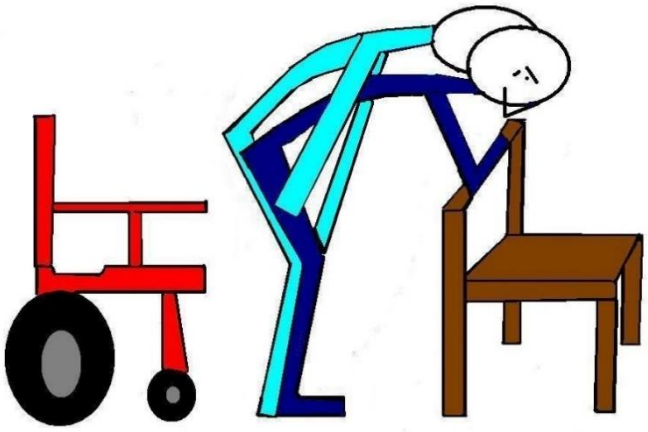
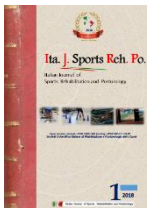
First we try to change the support situation with the not-affected arm, not on bed but with an chair and created on an later moment for the individual the opportunity that he can go to an toilet when is capable to set one or two steps. An chair isn't heavy enough to use the pull with the bended elbow and the strategy must be therefore more support on the chair to get the upper trunk forward and weight on the chair.
Second the extension in standing will be further training and that with load but also with little support from the bed in front of him (training of balance in standing position) Figure 3.



Picture 6.
Technique upper trunk forward with an bended elbow as support point.
The facilitation technique stay the same and important the extension of both knee.
The extension of the trunk can take place with an support only with the hand. But let this extension start in the trunk not in the head. Keep the head in flexion.

Test:
How much do the legs and how much do the arm the job.
A person with both Achilles tendon rupture stand for an bench and must train the remaining muscle.
He placed his hands on the bench and stay perfect on his toe. When he don't use his arms, he is incapable to lift his heel for more than 1 cm. The load that this patient has on his arm is very much , see figure 3. And training on that way, means that it is no training of the legs and in the case of individual with an stroke no exercise/ training effect of the affected leg.



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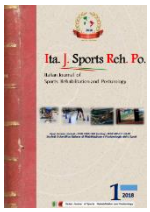
This is more difficult than the support on the bed. We say (photo 9) that an pull movement on an table or bed is possible and stimulated the upper trunk forward. That is now not possible because the chair will capsize. The individual must therefore set enough weight on the chair to prevent that and that can only when he makes an good “vorlage”.

Task-specific resistance treatment is now possible because when the patient need assistance than we know what R.M. max. is and we can give support and repeat that movement still muscle fatigue appears.
When we are with the training on this point, we have an execution on ADL level but in the therapy we going to search for possibilities to increase power, coordination and variation.
Standing up on this way will not stimulated very much the extension of the hip joint, the only positive point is that by moving the upper trunk in an flexion position the muscle gluteus maximus on the affected side stands every time in an elongation stand. That means that the muscle is long and that his action can be help the standing up movement but it is never the dominant action as normal standing because this muscle act only eccentric, never concentric.
When the support stay on the chair the action of the leg muscle is not very high and certainly not on the affected side , therefore make it always an Task-specific resistance treatment and train the muscle with overload.
Further a bended elbow makes the angle to the other site in the hip greater than 45° and that means that the adductor take the extension function of the hip.
The support on the chair takes much load of the leg away and will without an load or overload almost never give an fatigue reaction and thus no increase in coordination and muscle power in the affected leg .
The chain is by individual an stroke often only three because the affected arm can often not have an supported function certainly not on an chair rest.

The approach must be ;
- make it difficult. (resistance – load)
- search for rehearsal and muscle fatigue.
– be assure that the activity in the muscle, is there where you want him.

Make not the mistake to choose for an hands-off approach because everyone will seek for the manner that the movement can be done easy .
In this stage of the rehabilitation is the hands-on approach so important because now the therapist is capable to shift the body to the affected side and stimulated this side in working and feel the muscle action.
The individual with an stroke that must stand up will never be able to shift the weight to the affected leg while he is standing up and after 5-8 times when the fatigue comes in his not-affected leg he is on his limit. But with **Faciliation** in the standing up and the weight shift to the affected leg both legs will be fatigue and that means that there is something change in the affected leg.
That is only possible with an good hands-on approach !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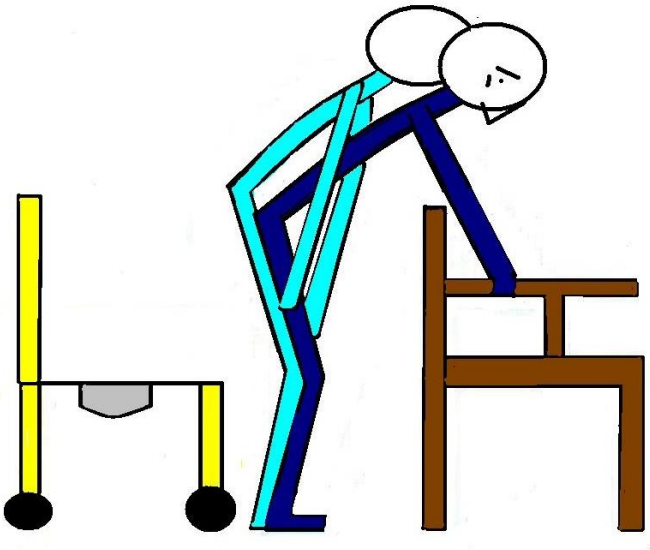

Picture.7.
Standing up technique with the support on an side rest of an chair. The same technique but now with the support on the side rest , that gives still an upper trunk forward but also another search to stabilization. Too much pushing abroad gives an tilt of the chair and that forced the patient to seek for an proper solution. (learning !)
But the upper trunk forward is less and that need more coordination in the standing up procedure.

Can we make the load greater by asking more extension of the upper trunk ? Of course is that possible. But the upper trunk in an backward position will asked for an retraction in the scapula and on the same time anteflexion in the gleno-humeral joint and that can caused damage the affected shoulder. That will be occur when to early the lower trunk forward together with the upper trunk backward is asked from the individual with an stroke and when the paretic arm isn't capable to get out the synergy.

But the risk on shoulder damage stay because the greatest part will be done by the not-affected leg and especially now much concentric work must be done by the m. gluteus maximus on the not-affected side. That will give in the dorsal diagonal, starting in the leg on the not-affected side an increase an muscle tone and that will also go in the rest of the diagonal. That means that the shoulder will go in an retraction and at same time we ask for anteflexion in the gleno-humeral joint.

That can damages the structures that lies between the roof and the joint cavity of the shoulder girdle. To prevent this the not-affected leg must be decreased in activity by placing him more to the front (picture 8a), now the affected leg must work hard and still we have an change of an retraction but not so high because the unaffected leg isn't so dominant , but still be careful. This is an concentric contraction of the buttock muscle that is asked for the first time in the exercise – standing up and stand and stand with no support directly on the front. In the practice on the ward /at home and by the ADL this way of standing up will be never done because this is so heavy and dangerous. But an very good exercise!

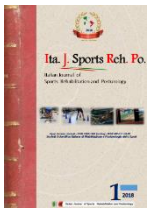

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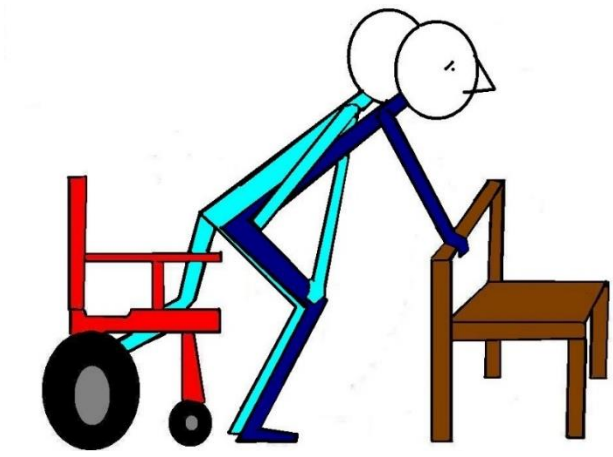
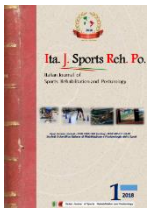
Photo 10 .
With the affected hand in pray grip by the not-affected hand.
This has as an advantage that the mobility of the fingers and wrist will hold and see that the affected thumb is on top. On this way we prevent that too much pressure of the not-affected thumb the affected thumb damaged. The chair is the point of rest and after the patient makes extension an try to hold this position. When the R.M. is less than 75% you can work with load. The facilitation is almost the same as by standing up with an upper trunk forward, only the hand on the knee must now make an slight movement to the front. Further the hand on the not-affected side is important to bring the weight good on the affected leg.



Picture 8
Standing up movement with more extension of the trunk and with hand on the chair rest.
The facilitation is an little bit different because now must the knee move an little bit to the front bevor the individual can go to stand. Therefore is the hand on the knee turn and stand the thumb on one side and the fingers on the other side, now we can pull the knee an little bit to the front and then stimulated the knee extension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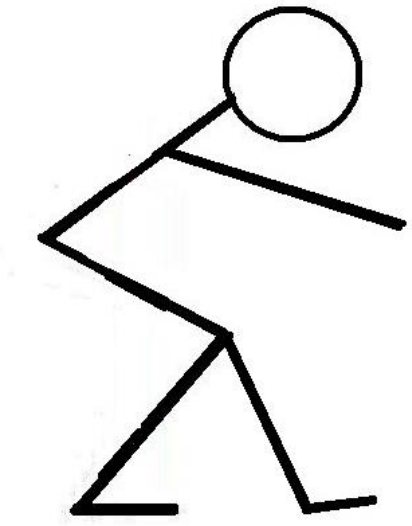


Figure 8 a.
This is called " the Cossack dance" and now the whole body weight must be lift by the affected leg.
This is for many people with no stroke very difficult but when we start on an high chair this can be an exercises that can create more coordination and power.
From an Investigation from Kim this give significantly better standing up, more weight on the affected leg and an increase in balance performance. (2015)
And the focus and the weight will stimulated the perception of the affected leg .
But remember the training rules = 3 session of 10 times by 75% R.M. and by 8 we see that the muscle is fatigue and that 3 times a week.

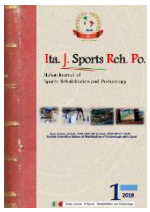
The difference between fatigue and muscle fatigue is, that the recovery of muscle fatigue is very fast , in 5-10 minute you can do the exercise again on the same level but the number of repetition can be lower.

Now we have stimulated the system to create an adaptation of the coordination and muscle power (Frans Bosch)

This can also be an Task-specific resistance treatment because when the individual cannot makes this on his one, than is that more than 100% and with facilitation we can decrease to 75% and we can repeated it often 10 times till we have muscle fatigue. Muscle fatigue we feel because or we must more facilitated or the moment is slowing down or the trunk extension change in an trunk flexion or all three together.

Now the level of the individual is so high that he is capable to stand up on his own or with very little facilitation and standing on the chair, we must teach and train in standing position makes the turn and walk sideways, forward and backwards with the table as support point. Furthermore it is now time to train and learn variation of standing up to stimulated the brain for an search to solve problems. The most important variation is different chairs , height or support points on different places and height.
Be aware that an individual; that train this program makes an recovery to almost normal. An individual that has recover from an severe stroke will be dependent to execute the standing up strategy with the upper trunk forward. Still is than the turn and walking side- ,for- and backward possible with the support of the table.

Turn on the table and walk side way .
Start with in an standing position after the exercises to increase the power and coordination in this position (picture 2 and 3) and then start with walking sideway.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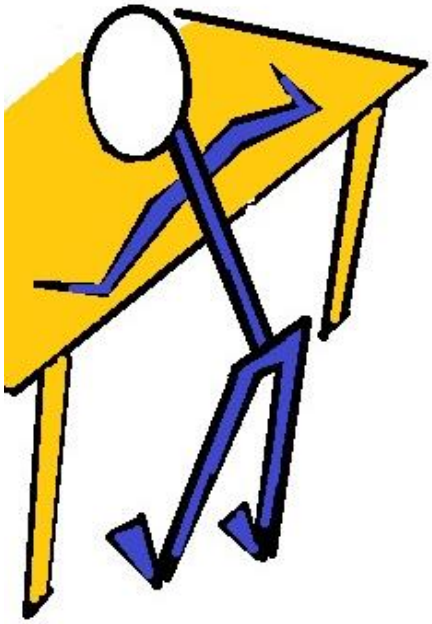
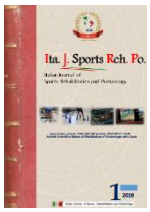
Placing the foot outside asked for an trunk movement of the other side and because the homolateral structure are weak, start with an upper trunk sideway. That gives on the standing side an shortening of the trunk but also an kicking away movement of the "free leg". That is the start to place one leg away and place than the other near to that leg and we walk sideway and directly exercise this in both direction and even the around the whole table.



Picture 9.
Walk sideway along the table with an upper trunk forward attitude . In the picture are two hand to support but often the individual with an stroke cannot do this. Look what he find the easy way to start, placing the not-affected hand more away so that the upper trunk on the not-affected side is shortening and then place the affected leg away and take weight on it place the not affected leg against it. Or placed the not-affected hand in the middle for his body and take weight on the affected leg and place the not –affected leg sideway , take weight on it and swing the affected leg near the not-affected leg. This last manoeuvre of the affected leg is difficult because the trunk is often still in shortening position.
Crossing is also possible but more for an later stage.
And all this exercises can be make difficult with load.

But this attitude has another great advantage because backward walking is very easy and is often one of the greatest problems for stroke survivor because they haven't learned the upper trunk forward strategy proper.
When the arm (s) stay on the table the free leg will go easy to the back and holding the hand on the bench/table often they can walk very soon an little bit to the back and integrate this with side way. The support on the table makes forward walking light but only in the stand phase because than the back diagonal is long and the muscle that must work are elongated. The difficult part is to swing the affected leg free leg to the front.
When there is an good weight distribution the swing phase is very simple to facilitated and then we created with the right assistance the starting of walking pattern around the table. This we need when the individual is capable to stand up with an table and to move along the table or start for an turn and take an walking support to go from this table away.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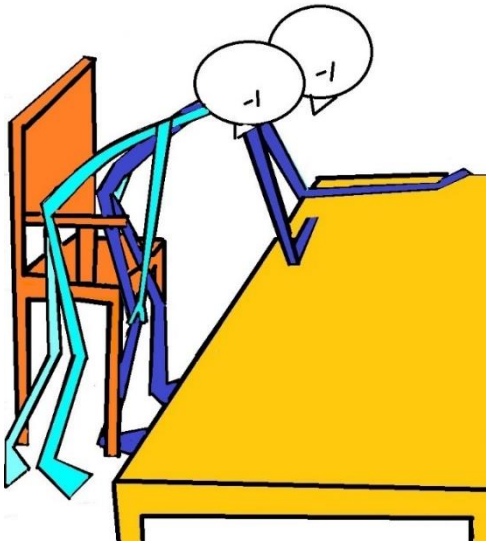
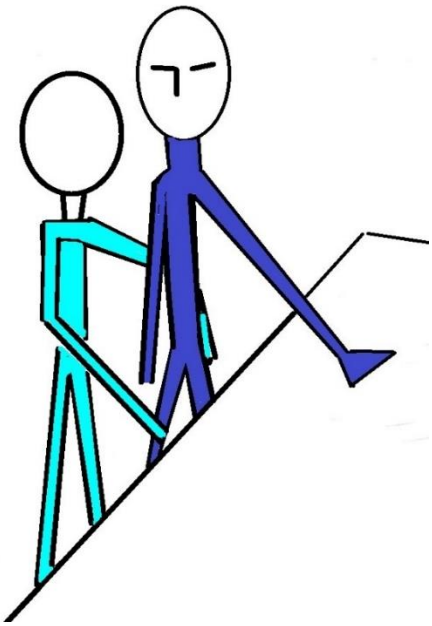
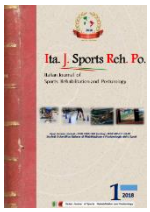




Picture 9a and b.
Starting with standing up with the support on the elbow of the not-affected arm and pulling on the edge of the table. And in this picture with the facilitation to stimulated the movement – upper trunk forward- and activation of the affected leg into the knee extension.
Than we must start with the turn and in this picture the not-affected arm stay on the table together with the hip of the not-affected side against the table, both can give this and stable support.
It is always possible when the affected arm has some function to place an chair there for an extra support.
With or without facilitation one leg must carried the weight and the other must be placed to the side. Placing to the side of the affected leg is possible by making an shortening of the not-affected trunk with or without facilitation (9b) and then standing on the affected leg place the not-affected leg in the same direction and often the turn is complete. We can choose to walk along the table to the end or exercise this movement directly with an rollator frame.

An rollator frame used by an individual with an stroke will be often only controlled by the not-affected arm /hand and thumb.
And the placement of the support bar must be on the same place as where the handle are of the “normal “ rollator frame. It is often wrong this handle turn to each other and than make an bar between them.
Better is to place the bar on the end where the handle were, because then the support point is the same as before and that is on or behind the rear wheels of the rollator frame (see picture 9c and d)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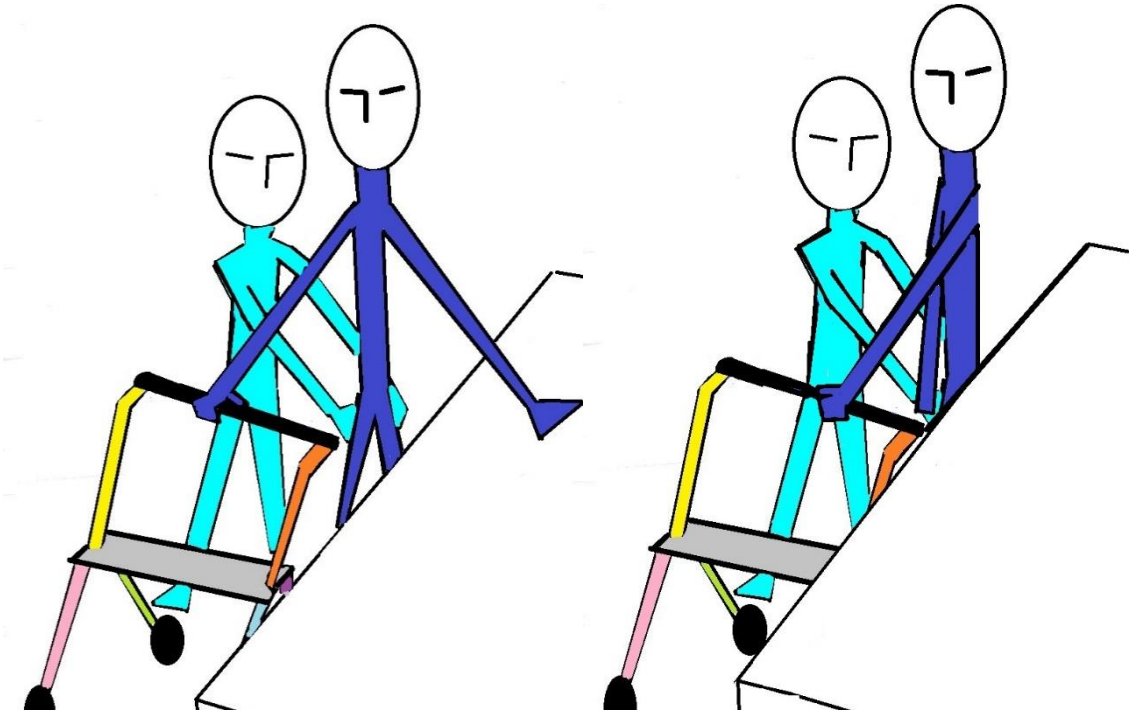

Picture 9c and d.
The difference how we want to turn. At the end it is important that both turns are possible but often the turn will be done over the not-affected side and then will be picture 9 d the next step. But when there is some activity in the affected arm, choose when it is possible, also for the turn over the affected side. And in this case we turn after standing up to get the walking aid to go away from the table.
This item is so important that this is an exercise also for on the ward and at home because the problem that there occur are often unexpected and now has the brain some experience more, to solve that problem.
Always after there are such problems on the ward or at home, exercise this situation because that is the best way to get an generalisation of the standing up , turn , remove the chair to the back and walk away - independent !

It is obvious that it is so important that the individual had the change to solve problems and that ask from everyone that is near the individual always the though : **"Must I assit or not".**
And where is the border what we can asked on the ward and at home in the rehabilitation period.

What is possible in the rehabilitation through the day. All movements are rehabilitation but must be all movements be at the limit !
We know, that you will ask: " This should be done every time that will stimulated far more "and that is correct , we want to, but when you have read this whole article in one time, how you will stand up out you easy chair? **Exactly with your hand on the rest of the chair !!**
Through the day the load cannot stay high the whole time. The ADL situation must have an lower load because nobody can hold the whole day his top level, therefore it is important what and when an training will be implemented on the ward or at home. And in the ADL there always

more elements that the individual after an stroke must master. That means that he must do often more task together and can the damaged brain that and then it isn't the right moment to ask an very difficult movement **. But is the rehabilitation-ward the best place for teaching and learning to move at home ?**

Variation, regrettable, is often on rehabilitation-ward very little, all chairs have an the side rest but also on the toilet we see this very often. That is different at home, there is the toilet so small that the supports are sitting on the wall or an the wall in front of the individual. That will increase the amount of "vorlage " and make standing up and coming in balance easier.
That means that on many rehabilitation department only one way of teaching of standing up is possible and that is standing up with the side rest on the not-affected side and that will be give no learning effect because the patient learn only one senso- motoric track and has great difficulty with other chairs/toilet etcetera .
Therefore we always start with standing up behind an table and after that with an chair on different ways and difficulty, that gives the individual an great number of possibilities that he can use to solve an problem that he has not experience in the rehabilitation -period. The support on the toilet at home is far more better than in the most rehabilitation wards because not only the "vorlage" is stimulated but also there is an support when the individual stand. We see this also happen by older people living in an nursing home and we see that this has an negative effect on the possibilities of the people. Every time standing up on the same way will give an wrong senso- motoric track and will decrease the possibilities much sooner than an variation of standing up possibilities and certainly in combination with task- specific resistance treatment. Toine van de Goolberg exercises an group 80+ that was not able anymore to walk on the stairs. There was no other pathology but only the amount of movement and always the same movement has make the coordination, the muscle power and the condition so weak that the stair walking was too heavy. He started one year ago with training task-specific with load and exercises for muscle fatigue but also total fatigue (condition improvement). Within an year all his participants walk stairs on an normal way and not one stair but more without rest.

Photo 11.
Standing up from an toilet with support on both side. The hip stand higher than the knee but the trunk has extension and the "Vorlage" is too little. Furthermore the placing of the feet is not correct because they must further back. Therefore this movement will be done with the arms and the balance seeking is thus difficult because there is no supporting point in the front. The individual with an stroke will go to the not-affected side and even has greater problems.
Look to the toes !!

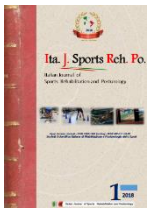

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Photo 11 gives us an picture what happen as people stand up always on the same way. The senso motoric track is always the same and the brain translated this balance action. That means that the standing up and standing position with too much body weight behind the feet can feel after an time **as "normal**. The next photo gives an picture what the reaction will be as someone gives the wrong facilitation and make the standing up movement and stand dependent from others.

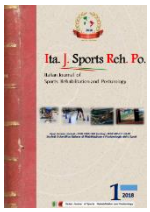
Photo 12.
The support is on the left shoulder from behind, this support will be answered through the individual with an left upper trunk back- ward – an action of the back diagonal on the left and in the upper part- we see the translation of the body because the right foot stand now further to the front. And then makes the care giver another mistake by asking to watch to here, because that gives an extension rotation to that side . Now this lady cannot stand up on there one but also she is not capable to stand on her one !!
An individual with an stroke (on the right) will experience that the right foot/leg goes in extension and that makes the balance very vulnerable.
And placing an foot for the affected foot is stimulating the wrong movement!

Individuals with an stroke will react much more heavy, because the senso -motoric track is damaged and they must act with the unaffected arm and leg and the arm must be used often because there is too little power to lift the whole body with the unaffected leg. Therefore it is extremely important that through good task-specific resistance treatment the right senso-motoric track will be train. But also that the environment makes it possible for the individual to execute his standing up strategy.

When we should train the standing up movement as in photo 12 the affected leg will go in an extension synergy and will never can have an contribution in the standing up movement and the balance will be only be control by the unaffected leg.
Investigation (Dr. v.d.Haart, Prof. Geurts) has shown that the unaffected leg has the greatest control over the balance by stroke patient.

Dr. Buurke gives an difference from 60% on the unaffected leg and 40% on the affected leg in an standing position by individuals after an stroke in the rehabilitation center (10 % of the individuals with an stroke in the Netherlands).

But when the individual after an stroke was walking and in this investigation only the walking movements to the front were included, than was the distribution 90% on the unaffected side and **10% !!!** on the affected side.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Of course this outcome was correlated from individuals in an rehabilitation center but the individual in nursing home will do worse.
There are no data what is happening by an movement as standing up, but we think that it is comparable with walking, maybe even worse and that the balance situation is very dangerous on such an toilet or shower.

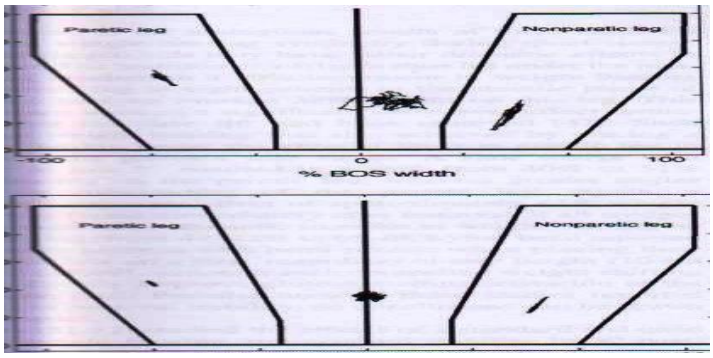

Figure 4. Upper part .
Stand of an individual with an stroke on two platform with safe belt and we see that the body goes complete to the not-affected side and that the individual stand on his heel on the unaffected side and on his forefoot on the affected side.

The upper part of the figure 4 is when the investigation start and the lower part is after 3 months. There is an improvement in the standing situation but the affected foot stand still on the forefoot and when this person go to walk (and maybe also by standing up) and the investigators saw no further improvement of this after 6 months.
Standing on the fore foot can be the only solution when an person has an striker foot and that occur often very early in the rehabilitation. This occur in the bed in seeking stabilization in the affected leg to move the not-affected leg – Striker foot!

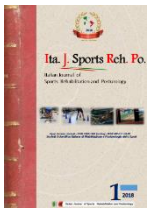

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Photo 13.
Individual with the affected side on the left side standing up without support from an bench. We see the standing position and we see the control of the unaffected side with an arm abduction, the trunk is move from the upper part over his hip and the knee /hip stand in flexion to give more possibilities to react in the joint when the balance isn't right . The affected side isn't part of the weight bearing and no part in the balance seeking. His whole standing up and standing is done and controlled by the unaffected side and no input- perception of the affected side will enter the brain that will be the case when he try to walk!!
The affected arm in an flexor (Movement ?) synergy because the unaffected leg use all his power to make extension. The diagonal on the back starting in the unaffected leg is dominant and created an retraction in the affected arm. The affected leg has an extensor synergy, the diagonal to the unaffected arm goes not trough the hip but on the inside of the affected leg and the adductors act as extensors.
He can do this but will never so stand without someone that watching him and therefore never at home without an support!

The patient of photo 13 will need an support to be able to start with walking and an support to stand alone. He perform an standing up movement behind an chair and then he makes an upper trunk forward to hold the balance on his best and to move the affected leg to the back. Because when the trunk goes in an upper trunk forward the affected leg that is free of the ground will go to back and he is capable to get an support on the affected leg with no danger of falling to the rear!!

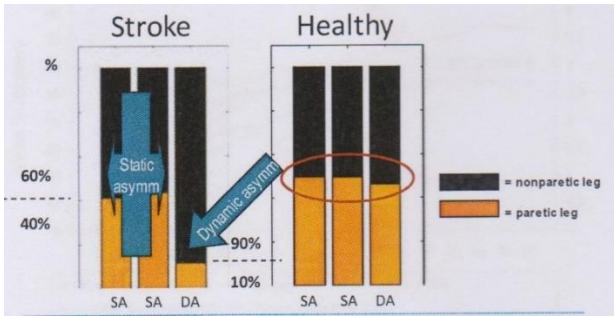

Figure 4a.
The difference between standing and weight bearing between the not-affected and affected leg and this difference when an person is walking. No data for this, about one of the heaviest movement – standing up !!

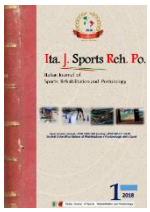

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Photo 14. He has make the turn and would like to shown that he is capable to get his affected leg further to the back than necessary . The most important moment is when he stand on his unaffected leg to bend his upper trunk, now the affected leg will move to the back. (Balance reaction) But this is also the moment that he must stand on his unaffected leg and "arm" and he check his balance complete with is homolateral structure (on the unaffected side), to place his affected leg to the back, because the diagonal are not there anymore.
But the control he had here is much better than when he is standing up with an upper trunk backward with no support on the front and therefore an upper trunk forward strategy. (photo 13)

The route for him to get more control on the affected side and more power and coordination for standing up, standing and walking must be always the same ! Before this will be an part of the ADL, we go to exercises this movement with task-specific resistance treatment with variation of this movement thus not only to the back but also to the side, front and as in an turn etc. Further variation are, change of support tools , we can use an cane or rollator frame.
Task specific, because we want improve the movement of placing the leg back when he stand on his unaffected leg. Learn to create an better position of both legs and therefore an better balance. We search for the R.M. 100% and can now train on the right level to get muscle fatigue. We do 10 rehearsal with resistance against the not-affected leg (sideways , backward and to the front) to train the affected leg and especially the affected hip muscle to build up an good keypoint on the affected side and homolateral structure. There must be on the affected side an concentric contraction !!
That occur in photo 16. Photo 15 give an impression how to increase the movement of the affected leg in this case to the back. Here we use resistance to increase the perception by asking more of the muscles and the muscle spindles.

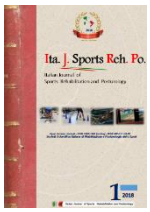

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Photo 15.
Learning to get the affected foot further to the back.
Placing the affected foot to the front and now the therapist placing his foot behind this foot.
First he step with the not-affected foot to the front , bend his trunk further and push the affected foot further to the back against the resistance of the therapist foot. The trunk bending but also the hand fixation on the chair will give the diagonal an base.

Starting this exercise against resistance can be done with the affected foot for the unaffected foot but in the beginning the movement of the trunk (forward) must be the initiator of the movement of the affected leg. Variation in direction will important because that give him the coordination and power to get an rotation in the movement and that is very useful when he turn away from the table or chair.

The next training is learn to set the leg sideway and that we can exercises on the same way as backwards but now start with making more coordination and muscle power in the affected leg and especially in the keypoint the hip. The sideways movement with resistance against the not-affected leg must build up more coordination and muscle power and give the affected leg an better place in the standing up , stand, turn and walk along the table .

One remark about Task-specific resistance treatment, there must be always an concentric contraction of the muscle of the keypoint joint.
That means that not only the abductor are active but also the adductor we must see an co-contraction !! Agonist and antagonist act together.

How we see that there is an co-contraction ?
Than will pull the affected side of the pelvis the unaffected side higher. We see an shortening of the homolateral structure and therefore the higher stand of the pelvis on the unaffected side !!

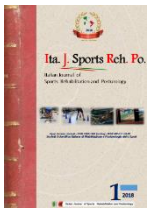

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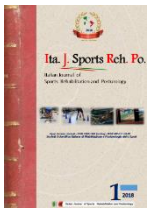
Photo 16.
Resistance against the not-affected leg R.M. 75% and the movement is sideways and with an high movement of the not-affected leg.
On this way motivation is always there because everyone want to win from such an old therapist !!
He activated now the diagonals between his unaffected arm and affected leg, not only the back but also the front and the keypoint !!
The therapist must try to get the angle of the diagonal so near as possible by 45°.

When you are on this level, this movement are possible on the ward in the ADL and often the individual can do it without facilitation. That means standing up with an table and move sideways and back to an wheelchair. Facilitation on the turn and backward placing of the affected leg is very simple. But there must be an upper trunk forward and an shift of the body weight on the unaffected leg. Standing on the not-affected leg and mostly no facilitation is needed but otherwise an little pressure to the back on the affected upper-leg is enough to move that leg to the back.
Of course will the resistance against the not-affected leg to the front be exercise because now we can exercise the movement of the not-affected leg to the front and stimulated the affected leg in his whole back diagonal.
The concentric contraction in the buttock now must occur and when this is happen , it is possible to get more power and coordination in that leg.
But it isn't clear what the perception in the leg will do and that part is very important in balance with confidence.

Load.
In the guideline stroke (2014) there is no enough evidence that exercises with load will create more power and coordination by individuals after an stroke. But an lot of that investigation are not TIDieR- proof (Stroke Round Table Conference 2016) and the most are not investigations that are be done in an task-specific resistance way. When we compared this with the training of athletes that are trained after an injury than there is an lot of evidence that the combination of task-specific resistance and load is the best way to get the rehabilitation done. (Frans Bosch)
And of course there must be an muscle reaction because otherwise there isn't a way to exercise muscle and especially muscle pattern.
Standing up is an movement that ask an lot of muscle activity and with load this task-specific treatment will lead to an increase of power and coordination, but than it is very important that the affected leg is exercises on the right way. Giving load when an individual is standing up isn't enough because he will search for an way to solve the problem and that is the task of the therapist ; to be sure that the affected leg is involved and that there is the contraction and the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muscle fatigue. Muscle fatigue will lead to an increase of involvement of motor units and also with an increase of cortical activity.
The activity in the buttock muscle (photo 16) is often so much that individuals complaint about muscle pain after this exercise and often after this exercise the walking pattern is faster, but that is in the beginning only an few meter.
After an longer time there is an increase of walking speed and greater step length.

Photo 17
Co-contraction .
The power that must be given is approximately 75% of the Repetition Maximum that the diagonal on the front - swing leg - and the back diagonal - stand leg – can give both. By an individual after an stroke is the affected leg the leg where the individual on stand. We have try to do this on an apparatus with load on the unaffected swing leg and for “normal “people this is possible but individual with an stroke is this difficult because they have need of an resistance that can correct immediately and then is the option with the therapist his foot much more easy to do.
Co-contraction we see the white line compared whit the red line (on pelvis level) go up on the stand site and that is co-contraction!

A.D.L.
This increase possibilities is often also visible on the ward because the movement is learned but through the task-specific resistance treatment the possibilities are greater sometimes is there even an generalization possible.
On the ward this lady with the left stroke (photo 9) but with some ability in here affected arm, see was able to stand up after the task-specific strengthening treatment and had learn to stand up with an upper trunk forward, to turn and to walk away from the table with an rollator frame .

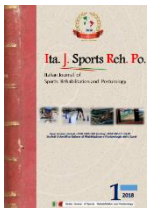

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Photo 18,19 and 20. Individual with an affected side left, standing up with upper trunk forward and pull with their unaffected arm with support on the elbow , than she makes the trunk further strait and start the turn to the rollator frame. Never out of balance and with more than 80% on the ABC scale.

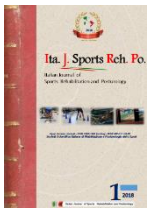
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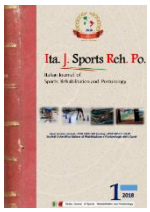
Photo 21.
Independent at last !
Only problem there was incidental that her affected leg stay behind the table leg.
Therefore the training on the ward was increased and she learn to standup and turn ;
First on one place on the table but latter on places where she wasn't on the edge and keep their balance and turn and walk along the table to the place where rollator frame stand. That sideways but also with support of one arm for- and backward.
Second , she learn to use this technique also on the toilet to use one grip on the side on the wall far in front and the same technique on the shower.
Third, this technique was possible with an chair (picture 7) and that means that standing up out of here bed was now independent and she was capable to turn and walk with the chair to every place in her bedroom and take the rollator frame in the corridor.

The environment was now for here adapted and she could on every place make their standing up strategy and had their independency back.

Side walking.
Sideway walking along the table to get on the end of the table and take than an cane or another tool to walk with. The task-specific resistance treatment we start with the body weight on the affected leg and that give 75% R.M. against the not-affected leg . Photo 16 gives an example but this isn't good always for sideway. He is trying but the stability of the affected trunk is not good enough to get an sideway step. Without resistance he can do better, thus we must teach the task- specific treatment first without resistance

To get an good sideways movement there must be :
A. An shortening of the trunk form the upper trunk to get an movement of the other leg further to the side but after that we want an elongation and abduction in the free leg (balance reaction part 2).
B. The hip (standing side) must have an co-contraction thus the pelvis must go up on the swing side.
C. In the hip that support the body must be little rotation, in the best way is none but isn't often possible , because especially exorotation gives immediately and decrease of the pelvis-position and an losing of the co- contraction.
D. The upper trunk may be flexed and an support in front and/or side, an table or an bench can be helpful.
Learn by placing the leg sideways on an small bench and then push it away with an strait leg and then go to an resistance.
And feel what the muscle do !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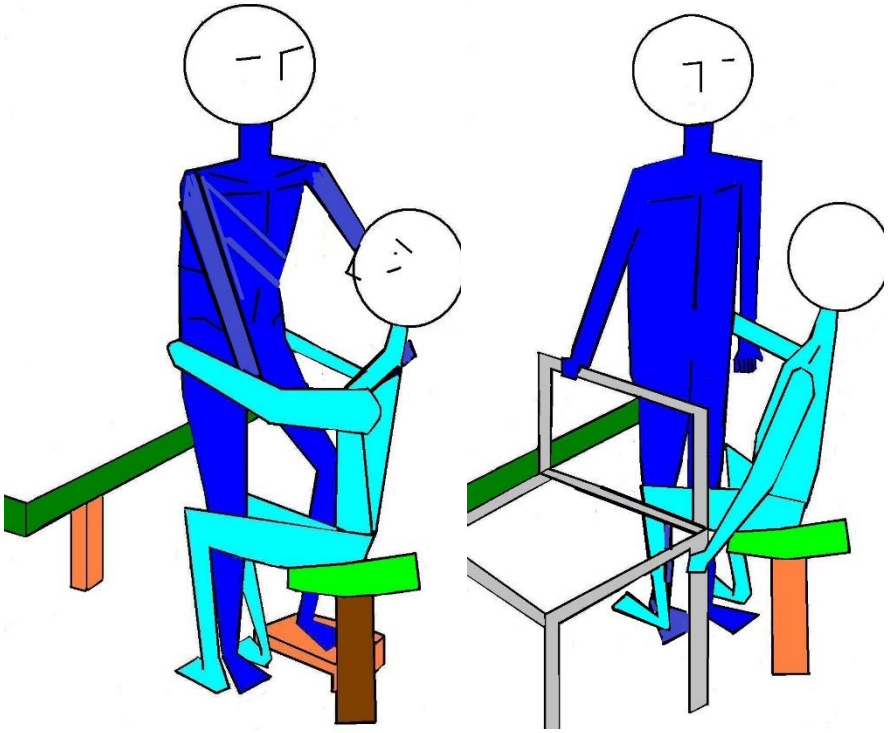
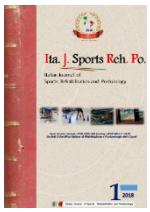
We want an concentric contraction and feel what the muscle is working.
Compared with other exercises and the not-affected side and be sure that this contraction is almost maximal.
Feel also the muscle fatigue!
Than you feel that muscle contraction is different!
Different because the contraction is slowing down and not so complete as before and again compared it with others and the other side



Picture 10 and 10a.
This two pictures gives an image how we can teach and exercises the affected hip to bear the weight and how we can train the abductor muscle to create an concentric contraction. The affected hip is the distal keypoint of the front and the back diagonal and important for the stability. First start with good support on the affected side, two knee of the therapist around the knee and foot and two arm/hand on the pelvis and the individual must try to lift his not-affected foot and place it on an small bench. Then put him straight on that bench, with the foot stand nice to the front. Now the abductor must work optimal- feel it. When the foot is placed with exorotation than the abductor muscle doesn't do his job. Next step, try to push the bench sideway with this foot position and in last phase(10a) push the foot of the therapist away, but on this picture the affected leg is changed (picture 10 affected leg is right and in 10a the affected leg is left) .

We need power in the affected hip because we do so many thinks in the standing and walking positions sideway and backwards and that is important especially in the A.D.L. We can train the abductor in the swing but than the other leg will do the most therefore give resistance against the not-affected leg – let this leg make the swing- and ask of the affected leg the co-contraction, the trunk movement and the stabilization in the keypoint.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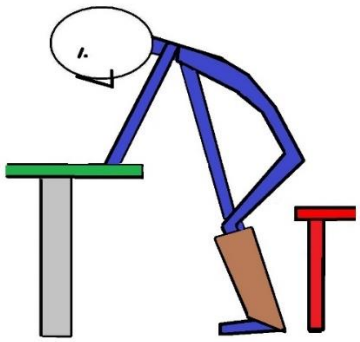
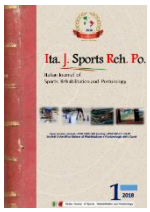
In an recent investigation was sideway walking exercises an part of the walking program and this group had an better walking pattern than the group that only exercises in walking forward. You can do on your one the trouser in sit on bed-edge but after that you must come to stand to finish it. Standing up from the bed, it is important that you can turn and have an support on the edge of the bed or an table/chair and then is the possibility to walk sideway or make an turn very important.
That is also the case on the toilet, you must find a way to get your trouser of the floor and get them over your buttock.
Thus after achieving the standing position there must be further trained to get more possibilities in the standing position.
Start with the training with an support of the arms on the elbow and important, can this with the affected arm?! An little support on the elbow is enough. Supporting with two elbow and resistance (picture 2) was one of the exercises to create more power and coordination in the standing position , now we can use that training again and try to create an support of the affected elbow, because that makes the bending movement an lot easy.
The trunk is in an upper trunk forward and reach with the not-affected hand and make it an ADL movement but also an task-specific resistance treatment and it is an balance training.



Picture 11.
With support of his affected arm on the elbow. Start with support on an bed that is an little bit softer than an treatment bench and is also the context in which this often will be done. The affected shoulder must have an retroflexion with retraction to create an fixation but remain the upper trunk in flexion otherwise the other arm is too “short”.
When there is an support we have now 3 chain and no support means only 1 chain.

The influence of the environment on the possibilities to stand up and stay in balance for people after an stroke.

Sitting on the edge of the bed and try to get to an standing position in balance and then take the walking aid and walk away or use the support to complete the dressing.
In so many rehabilitation center but also at home the situation is so poor that standing up isn’t possible without help and often there is too “much” room for the nurses and other care givers.
Sitting in an chair or wheelchair the problems are often also there. There are beautiful electrical standing up chair but the front is total empty. How to perform the upper trunk forward strategy and create an good balance. This space is again for the care givers and the rollator frame!!
Sitting on the toilet of douche chair. Again an room where on both sides is an lot of space and there is no support in front of the individual . The situation is for the care givers but the individual with an stroke has no possibility .



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Sitting on an table in an wheelchair makes standing possible but it is difficult and also dangerous with the leg support on it and with this leg support up, is moving to the front, to get something on the table difficult and sometimes impossible

Walking outdoor is an feeling of independency but it is also very heavy and then is an nice bench in the park very good. But often is sitting down possible but standing up very difficult. Take individuals therefore also outside and train and teach how the get up of this bench and furthermore ;

Tell people that not every bench in the park is good for elderly and especially individuals with an stroke will have great difficulties to get out of the bench.

To illustrated what the problems are an lot, photos of elderly and their problems with standing up and this people haven't an stroke because than it is often even more difficult.

Photo A.
The beautiful room in an rehabilitation centre but an room that will frustrated the individual with an stroke. To light , no contrast. No structure, no support on the front , no table and good chair .
But very much room for the nurses and care givers and lot of open space. For people with balance problem is this fearful. Place this bed with the not-affected side against the wall and make the room smaller.

Photo B ,C, D, E and F.
No front support (only F) that makes the standing up strategy easier and all bed barrier are "painfull "! Painful because when the person makes an vorlage, this bed barrier will pick in his upper leg and makes it difficult to place the feet behind the knee.
And no front support makes balance an great adventure !!

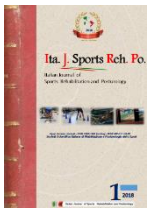

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Photo G.
An lady that never will stand up out this wheelchair because …
Photo H. The chair is too low, but the assistance will not increase their ability to learn independent standing up.
Photo I . Two people sitting in an wheelchair with always the lower trunk back and that create an "hillside" that must overcome to get to an standing position. **Photo J.** Nice but never an upper trunk forward possible !!

Photo K. An training of an individual to standing up with an upper trunk forward but there are elements that makes this woman afraid and she go with her head in extension (upper trunk backward). One of the reason is the bed carrier hurts and makes it very difficult to get the feet in the right position.
Photo L. This person complaint about his affected knee when he must come to an standing position. That isn't possible without assistance because the wheelchair is too low but the complaints of his knee are not responding on any treatment ! Why ? Angle of the knee ???? !!!!!!!

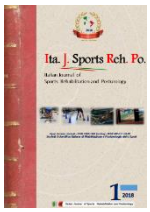

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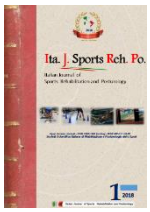
Photo M.
Standing up from an chair with an wrong foot placement but even worse, he is out of balance but we see no reaction in the feet. His brain doesn't know that he is falling back!
Photo N. Sitting on an table the game "active cues 'is one ! The Magic Table ! But for two people on this table the table is too high and she sit to close to the table and the lady in the wheelchair cannot go to the front because the leg support stand high and force the lower trunk in an lower trunk backward.

Photo O. This lady with an stroke – hemiplegic side left isn't capable to touch the flower because the wheelchair force their in an upper trunk backward and that is accomplish through the lower trunk backward and the wheelchair that stand in an capsized position backward. That means that she isn't capable to reach to the front and will never can stand up out of this chair.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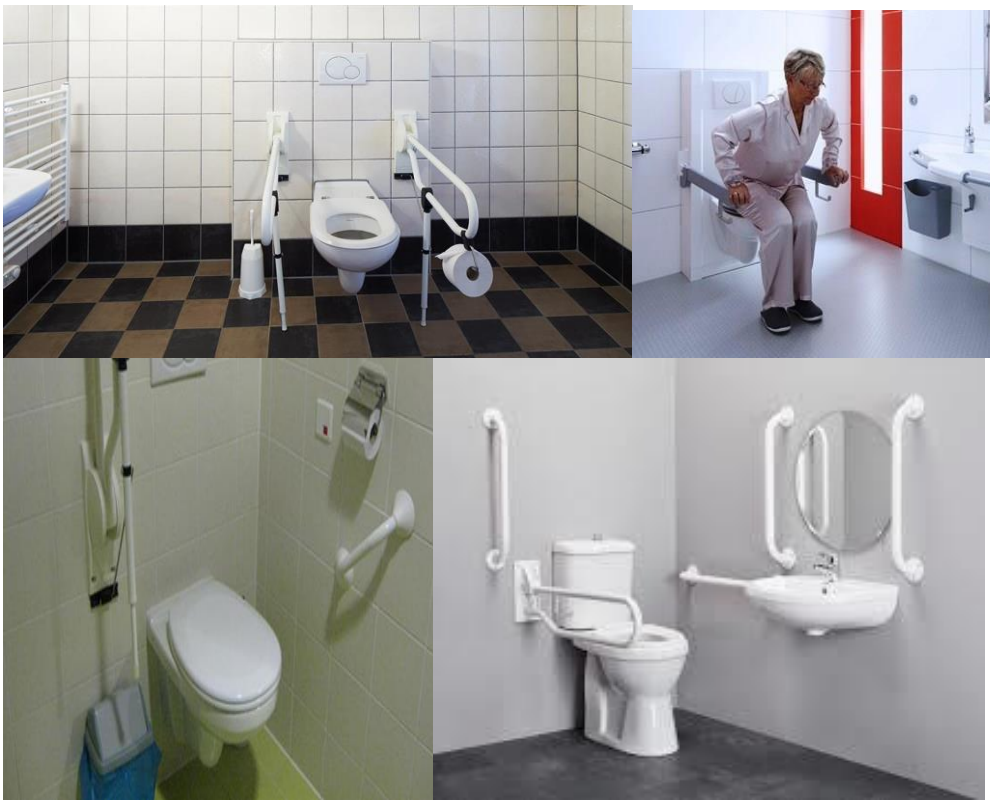
Two components are always an problem to stand up independent, for individuals after an stroke.

1. The height of the chair must be good. That means that the hip joint is higher than the knee joint and that means that the sitting pillow must have an shape that prevent an decline to the back and stimulated the pelvis in an lower trunk forward . Furthermore the leg support of the wheelchair must prevent the person from going in an lower trunk backward. And on all the photo's everyone has an lower trunk backward with leg support that stand high and stimulated this lower trunk backward. This people must work 4 times so hard to get to an standing position with only the not-affected side in the worst scenario .
2. Second problem that the execution of an forward movement from the upper trunk isn't possible because never is there an table that give the security to lean to the front and that possibility to pull on the edge of the table with an elbow support. The strategy that they have learn isn't possible and away is their independency. When we look to the toilet and the bad room this is often even worse.



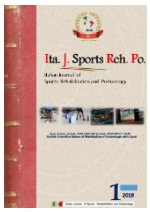


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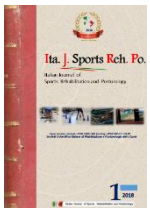
Photo P,Q,R and S.
Look to this toilet room and the placing of the support in this toilet room. Imagining that you have only one hand to help you in an standing position and that you must hold that standing position to get you trouser. Photo P and Q are examples that an individual after an stroke has great difficulties to stand up and stay stable. There is no possibility to stand up with an upper trunk forward and no support when the person stand.
Photo R and S has an support that ask for an reaching movement. (in R is this not far enough and with an upper trunk forward difficult to grasp because it ask for much exorotation in the shoulder and that is part of the upper trunk backward. But in Photo S the sink is perfect to an good upper trunk forward and in standing position there is in both cases the possibility to lean against that wall of sink or hold on the support when he try to catch his trouser.
But ….that ask for an good and strong hanging of the sink !!

Photo T and V.
The same situation in the douche. No opportunity to use the upper trunk forward standing up strategy and no support when standing in Photo T. But in V it is better but the support must then be on the not-affected side

Photo W.
An toilet /douche wheelchair that is used in many institutions and at home by individuals after an stroke.
And of course is it now possible to drive this chair to an room with an table or an bed and make the standing up technique possible.
But there is something strange on this exemplar ! When the foot support is taken away than he restrict together with the stave between the front wheel, an right foot placing.
That means that the individual must change his position first and go to the front of the chair because than he is capable to place the feet on the right way and stand up. That means that he is sitting on an smaller part and that can be grisly.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In all this environment support or adaptation, is it always an lot of space for the care givers/nurses. There is attention for the quality of lying and sitting but never or almost never for the independency of the individual after an stroke.
His restricted movement capacity isn't increased but decreased!

Photo X and Y.
Two beautiful electric standing up chairs but no possibility to make an upper trunk forward standing up movement because there is no table in front of them.
Furthermore often will the front side of the chair (leg-support) inhibit an proper foot placement and makes things difficult.
Why no table for the individuals?

Look at photo Y, this man has no problem to get out of this chair but he use the upper trunk backward strategy through his push with his both arms but still he is out of balance in this situation !
Look at his feet! And both are standing against the chair.
What is the reason that there are no support in front for people how have difficulty to stand up but can do it on their own with the use of the upper trunk forward strategy. But that asked for an good table?
In an nursing home this lady on photo AA give us an answer.
That place in front of there was the place for the rollator frame!
But asked we : "Can you stand up with that rollator frame on your own "?
No , than I get assistance of the nurse , she grasped my under my shoulder ! That means no upper trunk forward but an upper trunk backward.
And that means that as she will leave the chair , she need the assistance of an Nurse. And because she sit for long period in this chair and she has complaints on her buttock.

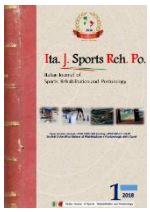

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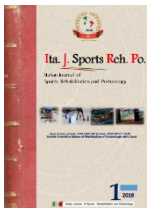
Photo AA.
This lady had an stroke with some loss of selectivity and strength on the left side. But there greatest problem was to use the strategy upper trunk forward because the support that she was given was the rollator frame and that stand to high!
To get here independency back we start with an task specific resistance treatment that must strengthening here legs and lower trunk muscle especially the buttock muscle and we learn here the upper trunk forward strategy through the placement of an firm table in front of here. Of course we learn also after standing up walking side way and backwards along the table and the turn on the end of the table to grasp the rollator frame.
After 3 months she had there independency back and stand up when she want and walk around the table several times.
But the nurses were afraid!!

The nurses and their family were not happy because they were all afraid that she will fall by doing so much walking through the day. That fear can also determine the possibilities of an individual with an stroke and can have also an great influence in the quality of live. The family give here an electric standing up chair for sitting, not for standing up and walking when nobody was there!

When stops the own control !

Photo BB and CC .
In nursing home the height of the table or the problem with an table and an wheelchair create often situations that someone isn't capable to do on an table that what he could do. Photo BB this table is almost on shoulder height he can get something of the table but with full shoulder action, but standing up isn't possible with the upper trunk forward strategy. Photo CC gives an pictures what wheelchairs with leg support up and plateau in front of the individual create an situation that moving is totally impossible .
An see how many wheelchair stand in an backward position and that makes an movement to the front very difficult. Again an example of not moving but only sitting in one position !!



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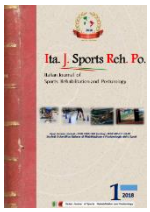
Outside is for many individuals after an stroke very difficult and not all situations can be changes but be aware that an bench in the park is often an great problem. Because for all he is make for sitting not for helping with standing up.
Most bench have an form that the backside of sit part is lower than the front part and that makes standing up more difficult.

Photo DD and EE .
The bench on DD is perfect and the trees stand therefore on the right spot and where used to exercises the upper trunk forward strategy not only by the individuals that had an stroke. Photo EE makes standing up very difficult , nothing in front but what is very good an solid ground around the bench.

Photo FF and GG.
When outside must be adapt for elderly and also individuals after an stroke than be aware that there must be an lot of places that can use to rest or support the standing position. But when the garden has no boundary it is often for people grisly to walk there and when there is an hedge this will help to decrease that fear. The Plant box will also help to dare to walk there and there is an support possible, to work there.



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The environment can do an lot for stroke survivors to hold there independency but very important is the possibility to get stand up and to stand in balance.

Active Elevator.

In many nursing homes, care center, rehabilitation center and hospital this tool to get people in an standing position is introduced without investigation which consequents this will have for the individual. There was one article (Burnflied), that investigate the reactions of students with E.M.G. apparatus and concluded that there was an certain resemblance and that this elevator maybe can used to teach and train standing up. When reading this article, it is total unclear why this conclusion was drawn because their own outcome show that it has no resemblance with standing up and therefore it is impossible that people that are disabled will learn to stand up on normal way with an good balance. The conclusion must be that this kind of care apparatus make people definitive dependent of the care of others and there will be much more happen than only an negative impact on the quality of live. For individuals after an stroke it can be very dangerous for the affected arm/shoulder and also for their rehabilitation because of the wrong balance perception learning part.

Photo.22
"Active Lift".
The power in the legs are too low and the balance is too little. The feet and knee are fixated, thereby stand the feet in front of the knee. Under the shoulder goes an string that lift the patient up.
Where start the movement ?
In the upper trunk – backward- also in the upper part of the back diagonal. This is all an reason to forbid it for individual with an stroke with an bad or hypotonic shoulder.
Never can there be an good foot placement and "vorlage" and the balance situation is wrong. And the individual stay "behind "his feet and that perception he learned as correct !! ?

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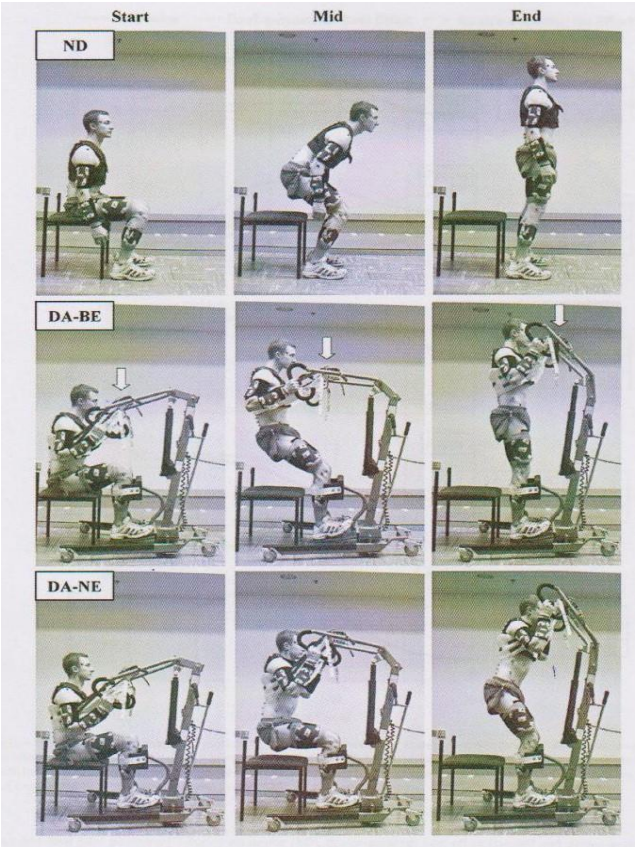

Photo 23
Research (Burnfield).
1. Student perform an standing up movement (ND) with an lumbar extension and no use of the hands. Lower trunk forward !!
2. In the active elevator was asked on the student to participated so good as possible (look to the stand of the feet and the reaction of the trunk)(DA-BE) He pull with his arms his upper body up.
3. Now was asked to do nothing and to hang on the string and on the hand. (look to both end position, the weight is behind the feet) DA-NE)
In 2 and 3 the body stand behind the feet !!

Next photo the coordination and muscle action from that investigation (Burnflied) !!

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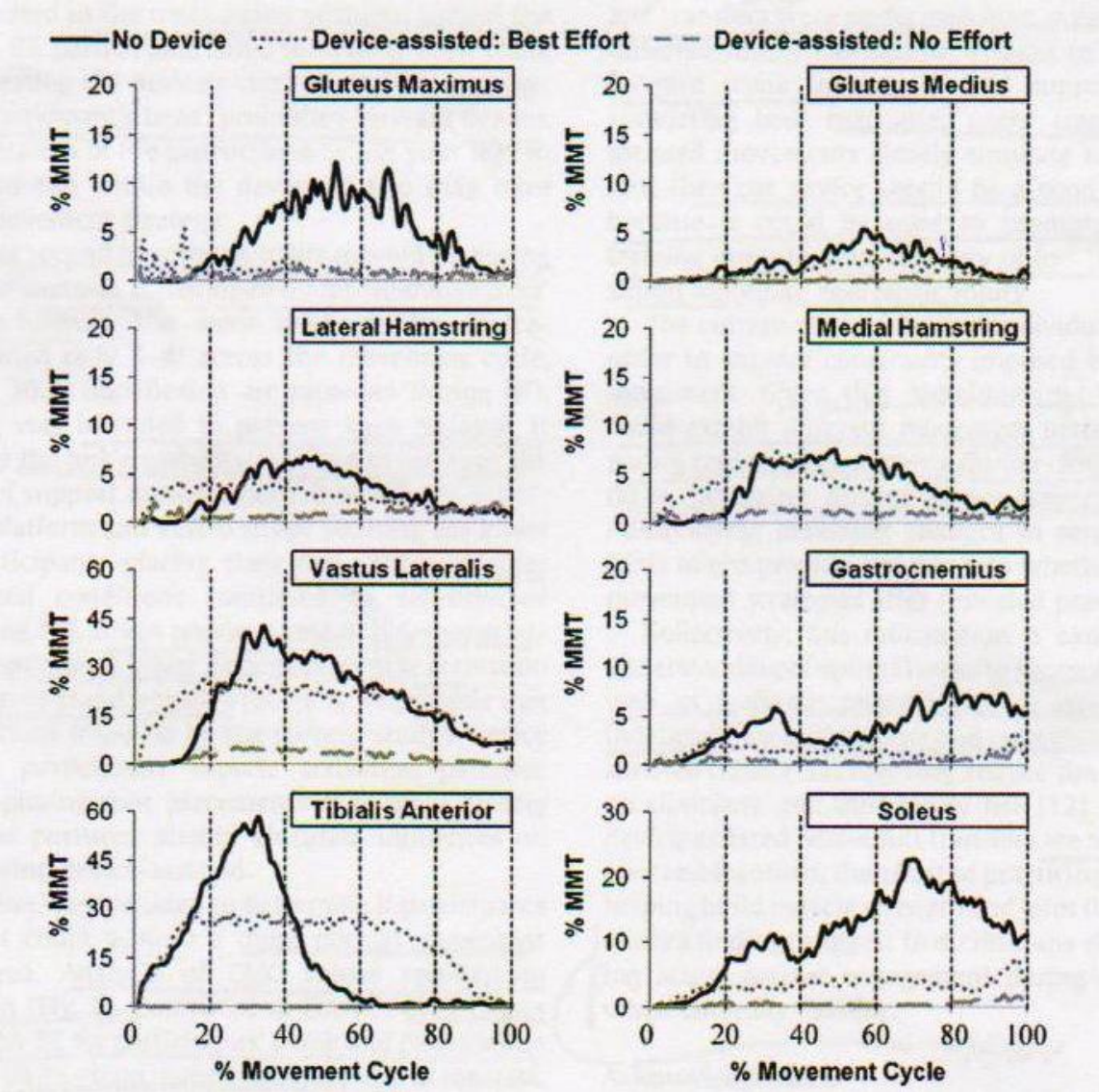


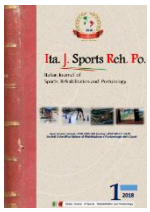
Photo 24 .

Black line standing up / dots active elevator with activity and short line active elevator with no effort of the student. See first the difference of the height of the black line, that gives an picture what is needed to stand up on your one but also watch when the movement start, because to early means by standing up falling back in the chair.

There is **no** muscle that can come on the right level and only the two muscle (feet) on the bottom start on time But the most important muscle by the lift off of the buttock show no activity.

How is it possible that you can muscle train by using this apparatus, there is too little R.M. thus no power increase. On the contrary there is an decrease of power and we learn the wrong coordination !

The muscle coordination is wrong in the leg muscle but there is no recording of the arm muscle. Than we had observed that the arm muscle by the standing up movement are low in activity and their coordination is an little to the front. Therefore in the elevator the coordination and the activity is totally different and much more especially in DA-BE !!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There is on other thing and that is in Nursing homes an disaster. Individuals “learn”, that this stand (hang behind the feet) is good and that they are in balance. They developed an new senso-motoric track in which they believed that they standing but also sitting straight and that isn’t true. The sitting in the chair will be worse because they dare not come to the front, even on the edge of the bed this people sit like photo 25 and when she had the opportunity to go lean on an table, they will not dare to do this and keep the pain on their buttock.

Photo 25.
This reaction we see almost always by individuals that “standing- up” with the active elevator.
This individual is afraid to go to the front but feels that he is not stable and must hold the edge of the bench to hold the stability.
His senso-motoric track is totally wrong and to correct this is almost impossible .
And this we will see also when he sit in an wheelchair and that will be increased when this chair is on the back lower than on the front. When the wheelchair is so composed that the attitude is an rotation of the pelvis to the back with an lower trunk backward (extension legs) will give this an collapse thoracic and an extension in the cervical spine
The solution is ; “don’t use that apparatus !!

Last remark , Look to the stand of the cervical spine (photo 22). This stand often in an lordosis because the pelvis is rotated to the back and the thoracic is collapsed and therefore must the cervical spine go in extension.
Prof.I.Baumans has investigated that this has an negative impact on the possibilities of the swallowing function.
Therefore when standing up isn’t possible on the normal way than we must do the opposite way and train and learn and introduced it in the ADL an another transfer, the movement that start with an upper trunk forward but that ask for an support point on the front
Therefore create an surrounding in which the individual with an stroke can use his ability to make an upper trunk forward without fear and created an situation that he or she can handle. That asked for situations that makes the upper trunk forward easy and for an program that keep exercises this movement and strengthening the muscle that are required to do so . **The active elevator will destroy the possibilities to standing up and move to the front but also destroy the correct senso - motoric track and have influence on sitting but also on swallowing !!**

Appendix

Static reactions (by all neurological diseases!!)
This are normal reactions in our first years (Barnes) and with this reaction we build up our possibility to move and create an lot of different movements that will develop more selectivity. The tone will decrease and we can move with great selectivity and differences, but the base will be the static reaction.
Damage of the brain can give the individual no option but to use this static reaction but that

means that the tone increase but also that the movements have loss the selectivity and that pathological synergy are dominant.

Every therapist will try to get back an piece of the selectivity that there was before, but that ask for an brain recovery and often we have only an brain compensation. Task-specific resistance treatment with learning principles as differential learning together with the practice in the context of the individual will be able to bring back an part of this selectivity. Especially the task-specific resistance therapy can improve the coordination and the power of the muscle pattern (power = strength × speed)
Thus static reaction we can "use" in the therapy, but it is very important to recognized this reaction because it means, that it is very difficult for the individual to perform and the general static reaction gives an picture that show that the individual isn't capable to cope with that situation and that we must avoid that situation .
Static reaction were divided in four groups;
1. Local ;
Positive Support Reaction
Negative Support Reaction
2. Segmental:
Cross Stretch-Flex Reaction
"Shunkel "reaction
3. General Tonic Reaction :
S.T.N.R. – Symmetrical Tonic Neck Reaction (active extension of the Neck to the end)
S.T.N.R. – Symmetrical Tonic Neck Reaction (active flexion of the Neck to the end)
T.L.R. – Tonic Labyrinth Reaction (attitude related and movement speed related)
A.T.N.R.- Asymmetrical Tonic Neck Reaction (active latero flexion/rotation of the Neck to the end)
4. Total Tonic reaction ;
Associated reactions- are movement with increasing of the tone /synergy when individual with stroke perform an difficult task.

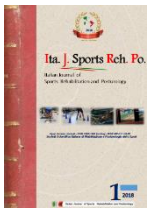
Local.

Positive Support Reaction.

On the moment that the ball of the forefoot hit the ground, se see an extension synergy, with this reaction this synergy makes it for the individual difficult possible to stand on his foot but he must rotated his affected hip to the back (the individual on photo 13 show this reaction). It is the base of support but it gives often an picture of an severe stroke patient with no or little perception in the foot. Very important is too change the foot plantair flexion and inversion and created an support on the foot without much pressure on the forefoot.

Negative Support Reaction.

When he (photo 13) release the pressure of his affected foot often the leg goes in an part of an flexion synergy that gives an much to high raising of the affected leg and make him very afraid. This reaction we see also by pain. Pain gives this stroke patient an withdrawal reaction, that goes with the flexion synergy and that reaction can stay on. Individuals with an severe stroke will often lie in bed on the back with flexion/exorotation in hip and knee, often till the end of mobility of the hip joint. This will evoke pain in the hip region and that pain will created an higher tone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in the flexion synergy especially in the semi muscle and adductor and after one night complete extension of the knee wasn't possible. And only with redressing plaster or sometimes Botox this was to reversed. Pain caused by pedicure can give the same picture. Be assure that the leg isn't capable to turn in exorotation to avoid the pain but also the hypermobility in the muscle of the hip (endorotator muscle) through an long stretch on the sarcomeres. This will have great consequences for the rehabilitation.

Segmentaal.
Cross Stretch-Flex Reaction.

By individual with an stroke, this can be in the affected leg an flexion but also an extension dependent of the movement of the unaffected leg. By children in the first year you feel the extension in the leg when we give pressure on the ball of the forefoot but watch what the other leg do, it flex and that is the beginning of the walk reaction. We have seen that individuals with an severe stroke have difficulty to raise the unaffected leg because the back diagonal in the affected leg gives no support but that flexion in the unaffected leg will stimulate the brain to use this reaction and now we see an extension synergy in the affected leg with the beginning of an plantair extension/inversion attitude in the affected foot (striker foot) Flexion of the unaffected leg can give an extension in the affected side. But an great extension in the unaffected leg can give an flexion in the affected leg and that is very unsafe when an patient stand on two legs. Miss Pat. Davies one of the world leading NDT senior Bobath instructors show us an picture in her book "Steps to follow" and I am honored that I may show it in this article .

Photo 26.
Individual with an affected side on the left side. There is an great body perception loss what is discovered by Pat.Davies (the therapist on the photo) and that gives the patient the feeling that the therapist push him out of balance.
In this case she moves him too much to the right !!
We all see that he is not in balance and that he must go further to the right , to get in the middle. This phenomena is called the "Pusher"-syndrome. He is afraid for falling and feel that she push here in the wrong direction. He must more to the left and use everything to get his "balance"- feeling back. Therefore he stretch his unaffected leg with great force and evoke an Cross Stretch –Flex Reaction. And his affected leg is going in an flexion movement synergy.
He will not listen to therapist because he is falling and work with all he has to get in **his balance.**
And that he is working with his not-affected leg we see also on the affected arm because there is an increase of the flexor synergy –back diagonal between not-affected leg and affected arm.

What to do? The anxiety is so heavy that he never will listen in this situation. This situation is too difficult for him. Set him in an chair and make sure that this situation especially in the A.D.L.

never occur , but also not in the therapy. See article about the ”Pusher syndrome” on the moment in preparation and published in this journal.

“Schunkel”reaction.

Different from the photo 26 , on photo 27 you see an individual with an stroke that walk for the first time without an cane and with no therapist on her side. The tone in the affected leg is very high and she use the “Schunkel” reaction to hold the extension high. “Schunkel” reaction is the massive extension that occur when the affected leg is in the swing phase but when there is an shift to the stand phase, than the extension is already there. In the training phase this is normal but there must be fast an progression and less tone otherwise we have an treatment what don’t can be use in the A.D.L. This ask now all her capacity and by exercising this high tone must change in an lower tone and more selectivity. Because than there is also an possibility that the balance reaction are coming back.

Photo 27.
“Schunkel “reaction.
The massive extension in the affected leg is present but this is the first time she walks without an cane and support of the therapist.
Now this reaction is normal but there must be fast change!!
This ask everything of here capacity therefore not suitable in the A.D.L. but as an exercise to learn how to cope with the situation is very good but be sure that there is an lot of variation also in capacity but also in walking directions.

General Tonic Reaction

When General Tonic Reaction occur than there is an situation that this individual after an stroke cannot handle. In other words an General Tonic Reaction may never be occur, there may be some signs but **never** an complete picture.

S.T.N.R. Symmetrical Tonic Neck Reaction.

Type one is the head in active extension and then we see by the individual with stroke , the signs are more in the affected arm/leg as on the not-affected side, an extension synergy in the arm and an flexion synergy in the leg. By other neurological diseases where both side are involved this can cause an fall because the extension of the neck gives an flexor synergy of the legs.

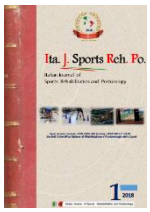

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Photo 28
S.T.N.R.
Sitting in his chair this person (Vascular dementia with an affected side right) got after 20 minutes, very silence. When he get out of his bed , he was talking all the way and after the transfer, he was singing. But after 20 minutes he got very quiet and after an 30 minutes he makes an lot of tone in the neck in extension till the end of the joint and that appear the S.T.N.R. The right foot /leg goes in an flexor synergy.

What to do ?
Back to bed and after 10 minutes he was again singing with an normal tone in the neck!

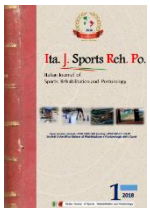
Conclusion

Sitting in this chair was too difficult for him and that can occur suddenly !! Watch people that grasp the edge of the table with the thumb under. The will stretch there elbow and they make no “Vorlage”. The will make an neck extension (Back diagonals) and when they need help by getting up out of an chair, they will increase the tone of the neck and arms and evoke an S.T.N.R. and will collapse through the legs.
By stroke patient it can be look as an Cross Stretch-Flex reaction but now look to the head , when there is neck extension this is an S.T.N.R. and it is therefore an exercise that is too difficult !! And pay attention on what you say ; “Stretch out” gives often an neck extension !! The foetal attitude has often an S.T.N.R. !!

S.T.N.R. Symmetrical Tonic Neck Reaction.

The other S.T.N.R. is the head in flexion with an high tone and now we see flexor- synergy in the arm and extension synergy in the leg. This look like the standing up training we discuss in this part but be carefully that the tone in the neck is not increasing, because you have then an extension in the leg but the individual can after that almost nothing, than is this exercise to difficult. But also sitting in an wheelchair this reaction can occur. In the book of Bengt Engstrom, he show an patient with brain damage that moves from the neck extension to neck flexion and both time the S.T.N.R. occur.

Picture 12 and 13.
You see on this two pictures that the S.T.N.R. is never total symmetric. In this case there is more tone on the right side (more damage) and the movement of the arms is almost nothing.
Dominancy of the back diagonals in the upper trunk and head!.



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By individual with an stroke is that difference between the unaffected side and the affected side much bigger and the implication is much greater than many therapist can image. The conclusion seeing picture 12 and 13 is, that the wheelchair isn't wright . An individual with an stroke, sitting in an wheelchair and he show you this reaction, that means that something isn't right in the sitting in this wheelchair. That can be the wheelchair but often it is the time they are sitting is too long. Be aware that an leg in extension, slipping from the foot plate can be an sign of an S.T.N.R., but look and feel the tone of the head.

T.L.R. Tonic Labyrinth Reaction.

This reaction is in Nursing home but everywhere where individuals with neurological diseases are staying and treated an reaction that occur very often. The reaction is flexion synergy in the arms extension synergy in legs and can be evoke by an **attitude** but more often by the speed **(movement**) of the transfer by the care givers. Arm in flexion synergy and legs in extension synergy means, that the back diagonals are dominant and starting in the head and that means often fear !

Attitude, often an bed attitude in which the head lay on the same level as the rest of the body. The head lay flat ! That means that never by individuals with an neurological disease and certainly individuals with an severe neurological disease the head rest may be standing in an flat position that evokes an T.L.R. By children lying on the stomach can also evoke an T.L.R. but then will flexion in the hip and shoulder be dominant especially with the head on the same level. Regrettable there is no investigation that has investigated which muscle pattern is than dominant.

Not only when the individual is lying on his back to rest in the bed but also not when the nurse start to wash and cloth the patient . This will be very difficult and the tone can be very high !!

But the most T.L.R. we see when the individual is help to **move** in the bed or to the edge of the bed to an sitting position and after that to the standing position..

When the individual isn't facilitated but is move with the speed of the care giver, you will see this by turning , coming to sit or coming to stand that every time the head goes in extension, the arms in flexion synergy and legs in extension. The speed is so high that the labyrinth sense an movement that isn't right and the brace – extension tone increase starting in the head – occur. The individual will be feel very afraid and that makes that the T.L.R. will occur sooner. Always will this T.L.R. –reaction start with the back diagonals in the head and upper part and with an upper trunk movement backward. **You ask to much of him.**

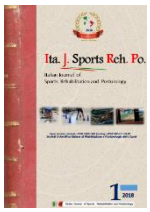

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Photo 29.
Sometimes faces say more than words!! This is of course no T.L.R. anymore the therapist has brace the reaction, otherwise he was falling against the wall. The extension in the neck and legs is decrease but in the face not yet.
Why or what has evoke this T.L.R.?

She was making an movement to the front to get an "Vorlage", but suddenly he go in an T.L.R. The reason in this case was beside speed also pain and that was evoked by the bed fence that hurt him on the bottom of his upper legs and that was enough to evoke an T.L.R.

Be aware of the difference: Pushing away with no neck extension is no T.L.R. but pushing away with massive extension of the neck is an T.L.R. What you see what happen by individual with an severe stroke that is making an transfer turning over the affected side (but we see it also by the turn to the unaffected side) almost on the end of the movement. Almost 80% of the individuals with an stroke make an total extension from head to the feet and that are always T.L.R. That is not only through the speed of the movement but also through the seeing of the end of the bed and the feeling that he/she falls out of the bed. Good technique of the transfer cannot always avoid this, but the T.L.R. will faster disappear when we give pressure when we turn the individual and give this pressure on the body when he is lying on his side. Than the extension often disappear and also the T.L.R.

T.L.R. can occur but that means that the movement we ask are too difficult and that means; " seek an solution" !!

A.T.N.R. Asymmetrical Tonic Neck Reaction.

The head is turn to one side and there is an end position of the head and an high tone, than we see an extension on the side that the head is turn and an flexion on the other side.
By an stroke patient will the turn to the unaffected side give an flexion synergy in arm and leg, and when the head is turn to the affected side an extension synergy. An pathological synergy on the unaffected side will not occur but often is there more tone in the extension or flexion dependent from the position of the head.
Photo 30 shows an person with an severe stroke in an A.T.N.R. lying on his back in an bed. That has us learned, that this static reaction is the last possibility that this individual has to control his body but that this is an very frightening situation. This person was resting in the afternoon on another bed. His bed was for repair not on the ward. He was put in bed from another individual who has an anti-pressure scores matrass in that bed. That matrass give him no stability and he must use his A.T.N.R. to have an control but he was very tired when he came out of this bed and goes immediately to his own bed to get an good rest. We had great trouble to convinced him to lose his hand and we have empty the matrass complete to get his tone and anxiety on an lower level and that he was capable to work with us.

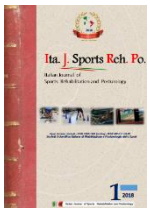
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Photo 30.
A.T.N.R. His unaffected hand on the edge of the bed and he hold this with an very firm grip. His head turn to the unaffected side in an end position, his unaffected leg lies with some force in extension. The position of his head evokes an A.T.N.R. flexion synergy in arm and leg.
The position of the leg is extreme painful for him because there stand an stretch on his adductors and semi muscle, the tone of this muscle was increase. But this decrease after the empty of the matrass and after correction of the position of the leg. The tone in the leg was still high and he cannot stretch his affected leg complete without pain for an day.
We were on time !!

Total static reactions.
Associated Reaction

When we see an individual with an stroke standing up of walking, we see often an increase of the flexion synergy of the arm indicating that this is more difficult than sitting.
That increase of tone is an associated reaction evoke by the diagonal started in the unaffected leg that must work hard to get the standing position and hard to hold balance and propulsion by walking.
We have also associated movements that are not pathological movement when we do something very difficult.
By men is that often an thread through the eye of the needle, we see that the tip of tongue coming out our mouth.
But see photo 31 is such an associated movement now necessary or is this an associated reaction? And that means that there is neurological damage in the brain !
But only the General Static Reaction must be avoid and be sure that they never occur.
The others Local, Segmental and Total gives us the view that it is difficult but not-impossible and can happen in therapy but never in A.D.L.

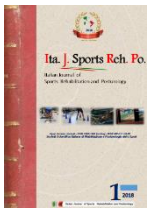

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Photo 31
Associated Movement or Associated Reaction ?
His smile is native but he has difficulty to hit this hammer on that increased head of the chisel. And we see that his tongue is between is teeth and lips.
This proportion is too big and this must have to do with the illness that later occur. But still he can do it but he must all he had use, to do this job. That is in an treatment situation good because we want exercise on the highest level but never in ADL.

End of part 6 , Part 7 will start with the re- training of the walking possibilities of stroke and why the diagonals were so important !!

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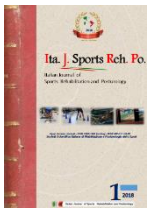

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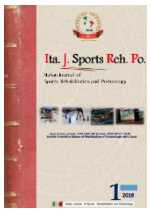

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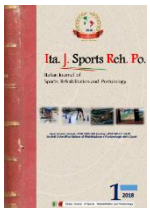

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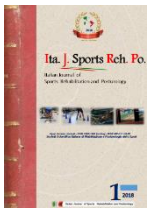

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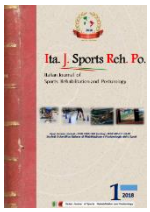

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