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# Rehabilitation of the upper limb after an stroke. Part 4. Dissociation and tone and tissue control!

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# Ita. J. Sports Reh. Po.



Italian Journal of  
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## **Rehabilitation of the upper limb after an stroke. Part 4. Dissociation and tone and tissue control!**

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## **Abstract**

**Introduction.** *The reality for the individual that has suffer from an stroke is visible in the text that an person with an severe stroke say: “ Brilliant that I can move and managed my shoulder and elbow and have less difficulties with the ADL and no pain, but at the end of the arm is my hand and that is purpose of al that shoulder movement to bring my affected hand in an position that I can use him .”*

*I was silent. He was right , I wasn't capable to get an good hand-function . He was able to pick up something and open his hand but only with mass flexion and mass extension . And often when he don't look to his hand was the object gone ! The therapy remain on that level but when stop an while, he experience what he loss in an short time and his motivation was present again . Still it is never the treatment goal to hold that level!! After the treatment of the flexor attitude and movement synergy, now there is more dissociation possible and that can be through recovery but also through an good treatment. But that means don't stop, go one with dissociation, also with the hand to get the highest possible level!*

**Design .** *The science has much efforts in the developmental of robotic and F.E.S. stimulation techniques but still today it isn't clear that this has the answer for the recovery of the arm and especially the hand and it isn't also clear or this is an better way to get more function in the hand. But obvious there is much more possible to get an better arm-hand function by using this inventions, but than for all stroke survivors with arm and hand function decrease. An eclectic approach will use everything to get an better result but always with an good base of science and with the training and motoric learning rules in the head. To get an result in the damaged brain must have an amount of intensity to get the brain working on his plasticity. The question remain that we not know how much plasticity an damaged brain has and obvious that is different for every stroke survivor.*

**Conclusion.** *Therefore therapist try everything what you think can help but also science keep on searching !! And this can also be done in the chronic stage of this disease. In this part also “manipulation techniques to get the diagonals make an better “communication” between them and the muscle pattern and create better keypoint. Often that manipulation is tone inhibition and hands-on technique to use that inhibition for an better facilitation and working on better movements also in direct relation with the A.D.L. Technique that often have great impact in the subacute and chronic phase.*

**Keywords :** *F.E.S., Arm Rehabilitation, Chain , Dissociation, Stroke , Diagonals, Mobility Restoration.*



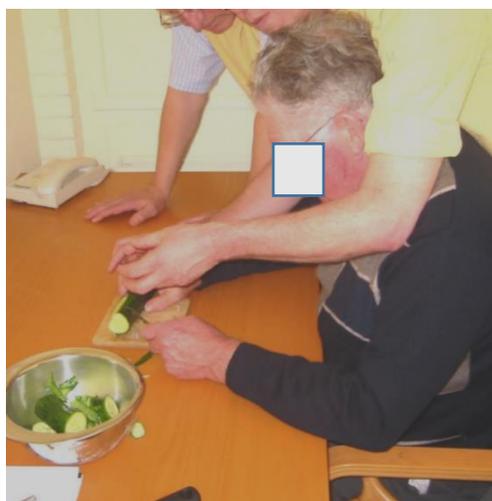
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## Rehabilitation of the upper limb after an stroke. Part 4. Dissociation and tone and tissue control! An multi-eclectic approach.

### Introduction.

Here part 3 ended with this photo of the gentlemen that use his possibilities he exercises by slice an cucumber. The goal must be that the possibilities after that treatment are translated to movement in the ADL and that this are movement/function that the person use. Because than the amount of automatic will increase and will be more possible. And ,yes, the possibilities of the hand are essential and that makes often the task to exercise on keypoint level so difficult but no good hand function isn't the same as no arm possibilities and the hand function increasing is an hot item in the rehabilitation science in all stroke centre all over the world. [1,2,3]



**Photo 1**

### Photo 1.

To get more control in the arm and especially in the keypoint and other example of the Guiding approach[4]. Holding an cucumber in his affected hand and with the other he try to relieve the cucumber of the skin. That means that the cucumber will be move away and he must stop that movement with his affected hand. First in this position but after that with increasing of the extension in the elbow and far to the end of the table by the next cucumber and maybe in standing position. This task is for him the priority. Photo 1 published with the responsibility and permission of the author by j.v.d.Rakt.

He knows what must be done and is searching for solution how to do this and do it so good as possible and when the extension in the elbow on the affected side was more, more lay on the table , more push came from the stomach, more tone in the front diagonal, the scapula stand better and the muscle of the keypoint has some control and he was able to remove the skin of the cucumber.

But there was also an another reaction. His feeling and attention in the affected arm was poor. Now there is no smile to the camera but deep concentration. Rehabilitation means that in the input and the output must be coordinated and that will stimulated the therapist to get as much as possible input in the damaged brain to create an recovery or an new network or combinations of every possibility.

And when the skin of this peace of the cucumber was ready, he lay down the knife and pull the cucumber with his not-affected hand out the affected hand an little bit further and continued with the skin removal. This are the benefits of the Affolter- Approach[4] and working with elements out the daily life. After this exercise the hand was often very relax. That wasn't always the case by his shoulder and therefore we give him an exercise to use the relaxation in the hand and wrist to get also more relaxation in the shoulder and still was able to move this keypoint with and without support on the surface. What the science has developed is an great amount of Robotic and/or F.E.S. [5,6.7.8,9](Functional Electrical Stimulation) for the total arm and for the hand but this amount of therapy is still today only available for few individuals after an stroke. Still the possibilities are very

great with this amount of therapy with assistance and will increase the amount of exercises patients can do with the paretic arm/hand. But the most important fact stay that this also must be translated to movements that the patient use every day and that there must be an generalization. That is only possible as the keypoint dissociation goes further and that the arm is capable the improvements to use in the ADL –practice and improve the recovery further. The movement that the Robotic and others systems make possible must be have an network in the brain, than this will be use through the patient every moment of the day. That means that there must be also an restoration of the input (sensory systems) in the brain and that in combination with the motoric skills[10]. An great amount of research about the value about senso-motoric treatment[11-18] has be delivered and has an great importance in the rehabilitation of arm/hand after an stroke and there must be also be consideration about the connection of the arm –upper trunk and the diagonals [19,20] To give an impression what Robotic can be see photo 2. Of course is this an treatment but till today is there no significant prove that this approach is the best and can give real recovery. On the contrary all robotic look no better than other treatments. But all this investigation have an great problem and that is replicability ! Robotic and F.E.S. is often additional or is compared with usual care that isn't further explained and therefore nobody can do this investigation again and invest or this investigation has an good conclusion that is important for the treatment [21]



**Photo 2.**

**Photo 2.**

An apparatus that help the patient to move his arm /hand. He see his arm on the computer and try to get with “his” hand the object and place it somewhere else. The system is capable to get complete control but in this device, it is possible that the system only than gives support when the person himself isn't capable to get this on the perfect way. The amount of rehearsal is very great and also the amount of variation but the question remain what happen in the brain ??

Photo 2 published with the responsibility and permission of the author by j.v.d.Rakt.

The investigation of all treatment must be done more with the knowledge : “what is happening in the brain!” Are there new networks or are the damaged one restarting etc.

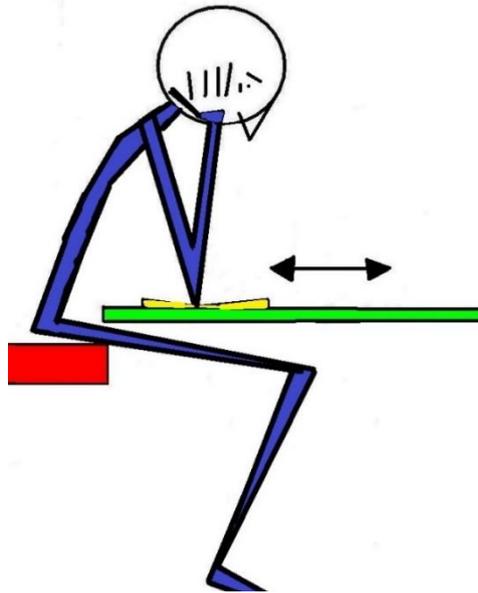
All new invention are always important but still not everywhere this invention are for stroke patients and there must be an translation to the practice of every day and an great amount of variation and increase of intensity ( load) . Load that makes the movement of an task-specific exercise difficult and give an increase of coordination of the muscle pattern /keypoint ( an increase of the keypoint possibilities) and power of that muscles. It is so important that therapist use all possibilities that they have to create an good treatment that increase the possibilities of the patients. Robotic certainly have an place but need good prove and available for everyone.

**Combination and eclectic.**

That and always an link to the ADL with help the individual after stroke to get the highest level of his possibilities and there is an keypoint dissociation with the best normal tone the best way.

To increase the amount of muscles in the keypoint of the diagonals is treatment that will be always necessary because the shoulder must have an anchor not only on the upper trunk but on the whole trunk to get that amount of dissociation that he can place the arm –elbow –hand on the right way.

**Keypoint treatment sec or with ...**

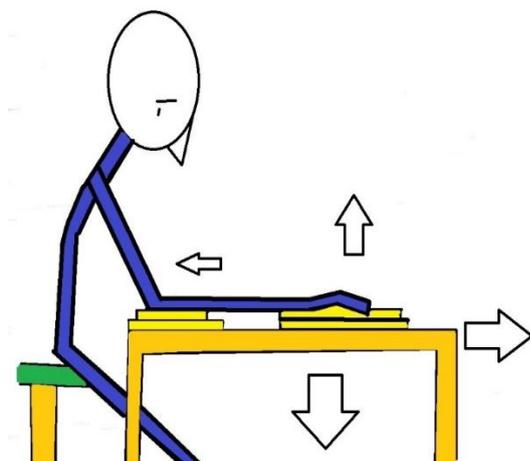


**Picture 1**

**Picture 1.**

Placing the affected hand against his face . He put support on his elbow and relax the upper trunk . That give an movement in which the scapula goes to each other – an retraction. But this is an relaxation and after that he can make an protraction by activated the front diagonal together with protraction muscle. Than move with the elbow to the front, lift the unaffected elbow of the table and then the affected elbow. Increasing his ability to move with the whole arm in the keypoint and make the possibilities greater. On the end he was capable to pick with the not affected arm, the affected arm and together make movements up with an good retraction above the 90°. The assistance of the not-affected hand was one finger in the middle of the affected hand.

Picture 1 published with the responsibility and permission of the author by j.v.d.Rakt.



**Picture 2**

**Picture 2.**

Control the arm ask for coordination and that we working on with the exercise that are possible give an load or an resistance and that in task-specific manner. But there is no reason to created exercises that ask not so much power but only the best coordination and no load. Try to move, so nice as possible with the hand /arm over the table and move both the towels. An dynamic closed chain but with much joint movement possibilities.

Picture 2 published with the responsibility and permission of the author by j.v.d.Rakt.

The arm and hand is on two towels on an table and the movements possibilities are plenty. To the front the hand and elbow together but turn to the edge of the table ask for an rotation in the gleno-humeral joint and an “control of the hand that towel is moving also. Turn to the inside or outside, turn to the inside without the towel and back on the towel, pick up the towel and turn to the inside or outside and put him down (when the hand can do this self or elsewhere with the hand-master ). Hold the towel under the hand but lift the elbow and make the table clean, the whole table. The hand master is an device that is capable with electro stimulation open the hand. That give the individual the opportunity to exercise his hand and reduce the tone without exercise. That (passive) is the “bad” part of this device, because through that part, many health care provider have stop the money compensation because there was no prove that it restore the hand functionality. Only this apparatus and no exercise will help the individual to control the tone and the trophic of the underarm and hand,

but will not restored the hand function. There is no evidence that it does something in the brain, but the combination of the hand master and exercise [26]has proven that this give an positive reaction. That isn't often an complete recovery but still an better hand function, therefore the combination is an possibility to create more possibilities in the hand and that will change the exercises because an shoulder movement that isn't for placing the hand for the object, is an meaningless shoulder movement.



Photo 3



Photo 4

**Photo 3 and 4.**

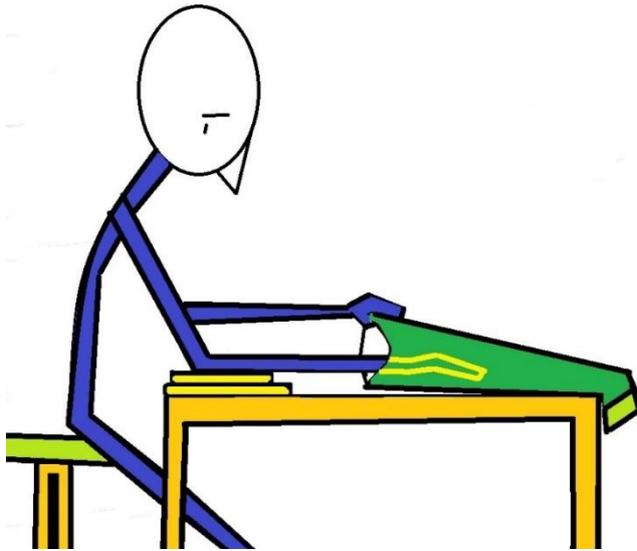
The hand master that can give an fingers-and hand opening, that is require to get something in the hand or out. Photo 3 and 4 published with the responsibility and permission of the author by j.v.d.Rakt.



Picture 3

**Picture 3.**

The individual is capable to move his arm over the table and control his shoulder, elbow to reach for an glass. But he isn't capable to open the hand enough to get around the glass. The hand-master can provide this extension in the fingers and he can pick up the glass and must hold it . Therefore withstand the extension by the hand master and support on his elbow lift the glass to his mouth eventually with help of his unaffected hand. Now the movement of the shoulder stand in service directly for the affected hand and that is very important. Picture 3 published with the responsibility and permission of the author by i.v.d.Rakt



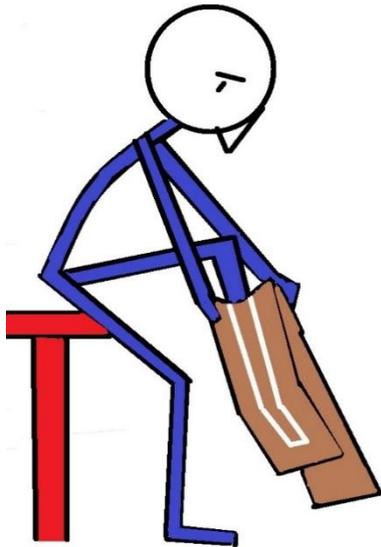
Picture 4

**Picture 4.**

To learn to put the arm in the sleeve the movement that has been done through the exercise upper trunk active in flexion with contraction of the front diagonal and therefore creating a good protraction. First with an support by an towel under the elbow but later on directly by an movement in the keypoint and pushing the whole arm / hand through the sleeve till the end, is for the daily life situation important because the sleeve is now on and can be pull over the affected shoulder through the not-affected arm. Picture 4 published with the responsibility and permission of the author by j.v.d.Rakt

When the affected arm is totally through the sleeve, than the not-affected hand can bring the other part of the sweater /blouse etc. to the head and not affected side. The part, bringing the affected arm in his totality in the sleeve till the shoulder, is so difficult because the perception is disturbed.

The most important action of the arm has an connection with doing things in daily life. Learning will succeed, when this is achieve and on an daily base will be executed. Therefore is more coordination and power in the keypoint necessary but provide always with an learning exercise that has an direct connection with daily life[22,23,28]. The structure in picture 4, learning in the activities to get more control over the keypoint of the upper trunk of the diagonal, is perfect for re-training or re-learning by an apraxia problems. Therefore the combinations of the structure and the control over the keypoint are for both very good to use. Using both hand/arm to get the trousers on that means that the individual is capable to hold and to move in the keypoint. An combination of task- specific resistance treatment to increase the power and the coordination must lead that the two hand together hold the sleeve of the trouser and make it possible that the affected leg and after that the other leg go into the right sleeve. Still is this an open chain but when the control is present in the keypoint than is only holding the position enough to make it possible. In this can the hand-master give an assist in holding the trouser.



**Picture 5**

**Picture 5.**

Looks easy but is dependent of an keypoint function. To hold the pipe open and so open that the affected leg can go in is difficult. When the lift in the arm had element of the flexion movement synergy than will go the pipe in abduction/exorotation. And is the extension movement synergy dominant than will adduction with endorotation. The hole of the trouser will be than very difficult and is this no solution. But when the arm is capable to get together with the unaffected arm an good situation, is this the best exercise there is. In the picture the unaffected hand is on the upper side and the affected hand under that is an adaptation found by an individual with an stroke. Look always what closed chain the person makes and or that the stability increased. Picture 5 published with the responsibility and permission of the author by j.v.d.Rakt

Working with two hand is always the best way to learn, solving problems and then it is important to search to the missing links in the coordination and search for an task –specific exercise that can be trained with resistance or load to increase the power but especially the coordination .



**Photo 5**

**Photo 5**

Dry the cup. His affected hand hold the cup (left) and with his unaffected hand he dry. It isn't so fast as early but he enjoy it. He want to do this in an standing position and he has balance problems and that increase the tone and the synergy elements in his affected arm. He make it difficult but he has also found an solution that the tone increase isn't so big ! He create an closed chain and stand more on his not-affected leg and can control the tone is his affected arm/hand. Photo 5 published with the responsibility and permission of the author by j.v.d.Rakt

**Placing the cup on the dresser, he has more feeling of an good balance and the cleaning goes faster.** Standing position is therefore in daily life important and will also important in the treatment because handling and balance come together. Of course is there an possibility to do it in sitting position but when the motivation is there always try to get this done with the right coordination in an standing position. That means that task-specific resistance training also must be given in an standing position to give the individual more possibilities to solve an problem in the daily life situation.



**Photo 6**

**Photo 6.**

Another example ; Cutting an cucumber in an standing position, again an balance problem and we see that the affected hand /arm has to many endorotation and she told that she feel here affected foot and especially the toe are clawing. There is also an shift to the unaffected leg. Three problems that makes this still difficult but three problems that can be train to get an better result. But she managed this and we can exercise on part elements arm/hand , balance etc. Than go again to this cutting work !! The progress will give the answer !!Photo 6 published with the responsibility and permission of the author by j.v.d.Rakt

This asked for part exercises and in that part-exercising has room for task-specific approach and an learning situation in which she solve the problems through the increase of the coordination and the power of the keypoint shoulder. The balance problems is often the border of performance of ADL in standing but this lady has complete right that in the standing position cutting has more power and cooking goes faster. This is an motivation that will be the base to train further to an higher level. But very important is to hold an optimal dissociation, because than is the control there of the synergy and will also the tone in the hand be lesser. Therefore be careful with an standing position that asked for an lot of control of the not-affected leg and through this intensive control will create an higher tone in the back diagonal [28] and will have an negative influence on the keypoint and for the performance of the whole arm/hand. This is often the great problem by patient after the sub-acute stage and that asked for an treatment that start with control of the trunk –diagonals and when that isn’t done properly will get another problem. The structure of muscles , not –contractile tissue and nerve structure will change and give problem to create an better coordination. In the coming part we will give this our attention and this can be use by individual after an stroke in an chronic stage.

**Keypoint training in standing position.**

Discussion of the treatment must be hand-on or hands off isn’t important. Important is that on the end the individual is able to do it. And when this is reached by hands- on that than is perfect. When an patient has try it an 1000 times and it doesn’t succeed, why we try not the hands-on approach. Many individuals after an stroke in an nursing home will never be able to do somethings without an good support and create there the base to go further and on the end without this support. Restoration of walking abilities is now done with all kind of apparatus and this also an “hands-on “approach, therefore what is the difference is between that “Apparatus –hand –on approach” and the facilitation technique of an skilled therapist “Hand-on approach”. And the first investigations show that apparatus isn’t better than an skilled therapist. Further one there are reasonable doubt about the right way of learning walking through the apparatus approach [29]But nobody will wait till this individual can it without giving support. Therefore an good assessment and an good treatment plane and start with exercise to make the independency possible and every one start with some assistance – hands- on !! There are masters in the hands-on approach! Especially in the sub-acute stage and chronic stage is the hand –on approach essential to inhibit what isn’t right and make an treatment possible that increase the possibilities, coordination and the power of the muscle pattern –outside the two movement synergies [30.31.32] Such approach isn’t an assistance of the movement but will help often in the neighborhood of the keypoint of the diagonals. This facilitation makes it possible to move better and

create often more pattern in the diagonals and gives therefore an better version of the movement of the task

This ask for many years of experience and the only method to get this experience is to get an good teacher and many hours of training. Of course is this influence –facilitation- more than only the correction of the spine-, but the base is: working together of the diagonals on the front and the back. This and also an assistance in the holding of the balance but also increase the amount weight on the affected leg. This technique started with the Bertha and Karl Bobath [35,36,37] has develop further in the N.D.T.-(Neuro Developmental Treatment ) and today this developmental is increase through the cooperation of I.B.I.T.A ( International Bobath Instructor Training Association [38]) with scientist all over the world on the area of neurology and neuro-rehabilitation. The skills that this group of tutor and instructors have, must be the base of every therapist by neurological patients, together with the new evidence that the science find on this area.

The facilitation technique showed in the following photos (Hands- on facilitation) gives the individual after an stroke an positive feeling that he can do something with his arm/hand and will stimulated him to exercise to an higher level in which the dissociation of the keypoint shoulder is very important..

### **Intensity**

And the intensity of that exercise must be high. Again we need an stimulus that make the muscle fatigue but also stimulated the brain for searching for solution. The result will be that muscle increase in power and coordination and that the “brain” loss his motivation to search for solutions.[24,25]



**Photo 7**

#### **Photo 7**

High intensity and with an great an – and aerobe effect but also with an good flexion of the upper trunk to use the optimal protraction of the scapula and with an good tone and power of the front diagonals. Still the difficulty is the way to the therapist glove because that is an open chain. But when this is possible and with an good attitude the maximal effort of the push will stimulated the whole movement of the upper trunk /shoulder and will stimulated the coordination of the whole without the necessarily of an good hand-function. The goal –extern focus is so perfect , you never need to explain !!

Photo 7 published with the responsibility and permission of the author by j.v.d.Rakt

The high intensity is visible in the exercise of the treatment of this patient in an course in Spain [40]



**Photo 8**

**Photo 8.**

Again an almost open chain but through the weight in the hand the chain has more possibilities as an open chain because the end has an “anchor”. There is facilitation because he standing with his affected leg in front. But the whole attitude isn’t so dominant by the back diagonal, the stand in elongation and still the patient must try to swing the weight to the front and the next component is not only so far as possible to the front but after that also so high as possible. The hand must hold this but we can tape it a little bit an exercise power and coordination for the painting exercise improvement and the use of the paretic arm /hand in the daily activities !That is the goal !!

Photo 8 published with the responsibility and permission of the author by j.v.d.Rakt

The best effect of this very intensive activities is the increase of coordination and power of the keypoint and that makes the dissociation better and will give an much better control over the pathological synergy. This people use their arm/hand with an goal !!



**Photo 9**

**Photo 9.**

Beautiful exercise with an huge intensity !!  
But what is the goal !! Upper trunk exercising or balance training ? Both !!

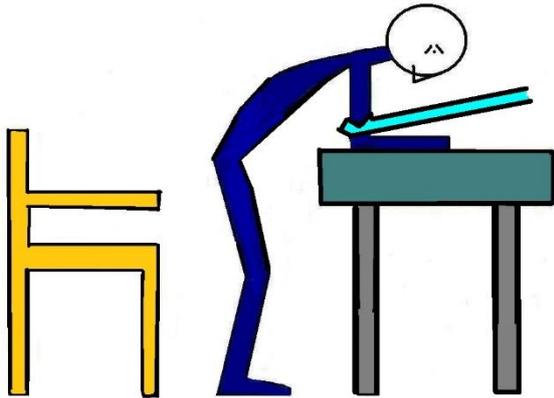
When the affected hand has difficulty to hold this, placed the affected hand under the not-affected hand and swing between the legs to the back and after that so far as possible to the front and after that so high as possible.

This is aerobic and anaerobic an balance exercise because this weight between the legs asked for an standing on both legs equal otherwise will the weight goes too far to one leg and is the swing between not possible . But the movement to the front asked for an reaction of the back diagonals all away from the feet to brace the fall movement to the front when the weight is going up and reverse when he goes down and to the back between the legs. The keypoints of the trunk (Hip-shoulder[19,20]) must work and stabilized the whole and still be able to let the movement go further.

The muscle fatigue will be fast and this will increase the coordination and power of almost all muscles. Everyone think that now the back diagonal are dominant but that isn’t possible because through the speed and the swing must the cooperation between the two diagonals be almost perfect.

Photo 9 published with the responsibility and permission of the author by j.v.d.Rakt

Of course is this also possible in an closed dynamic or half closed (dynamic) chain. The most important goal is that the exercise gives an improvement of the possibilities in the selectivity of the affected arm.



Picture 6

**Picture 6.**

Standing position with support on the bench. Pulling the upper arm ask for an reaction in the front diagonals from the upper trunk, pushing against the upper arm will stimulated the lower trunk to get more power to the front.

Both will lead to an better muscle power and coordination. That must be integrated into the possibilities to have more stabilization in the upper trunk and scapula.

Picture 6 published with the responsibility and permission of the author by j.v.d.Rakt

In standing position this is also possible with task-specific resistance treatment with the assignment to hold and resist the pull from the therapist. And doing this 3 times with 10 rehearsal 3 times in the week this will lead to increase the strength in the front diagonal from the upper trunk [25,41,42]. This must be transfer in the practice of every day . That means that the patient must learned to use this increase of power. This is an aspect of therapy that is almost vanish. The skills that many therapist such as the Bobath-(N.D.T.)- therapist have, is through the critics go to an lower level and many therapist are not capable to give this part of therapy. This because the science has found that this neurological method has no superiority in comparing with other method or concept. But this way of working is never be an item for an investigation and that is an pity because there lies an enormous amount of knowledge and skills. The scientific approach now develop, has regrettable an lack on superiority and it is time to meet each other and look to the patient what care he need and invest that care/treatment with an open mind and with good investment skills[43,44]. That means that we all must use the TIDieR [21] scheme to get the job done well. Further that this must lead that all neurological-therapist are able through hands-on facilitation and manipulation of joint, tone and nerves and other tissues to make it for the affected side possible to react and that makes every therapy better possible.

Therefore we choose for an **eclectic physical therapy approach** in which all parts, that can benefit for an better outcome.

1. Task specific resistance treatment.
2. Differential motor learning and other forms of motor learning when it is possible for the individual with an brain damage. The brain must search for solutions.
3. Use of all technical resources as electro, robotics, AFO, Locomat , Grail, Ceram etc.
4. From the beginning an translation to the world of the individual with an stroke, pointing on the ADL and IADL to get his independently to high as possible.
5. Learning and exercises on the all I.C.F. levels , function, activities and participation.[45]
6. With the use of hands-on and hands-off facilitation combined with inhibitions.
7. Manipulation of the tissues as muscle , joint , nerves etc.

All together will the results be better and we create the highest level of participation. This ask for good research, that compared all this with each other. Because no individual with stroke is totally equal with another survivor of an stroke and the treatment must be pointed on an individual scale.

The first step is in taken in 2016 by developmental of the TIDier Guideline[46] to get to an better description of the intervention and control treatment and to more research to groups of individuals after an stroke. Now will it be possible in the future to create the best approach for each individual after an stroke including the cognition and neuropsychologists elements

Muscle, joint, nerves and other tissue can be manipulated and that give as an result that often the domination of the synergy is lower and that the tone isn't so high. Furthermore will stretch on muscle

lower the firing of the muscle spindles and therefore lower the tone and is there an possibility to increase the power of the antagonist (reciprocal innervation [47]).

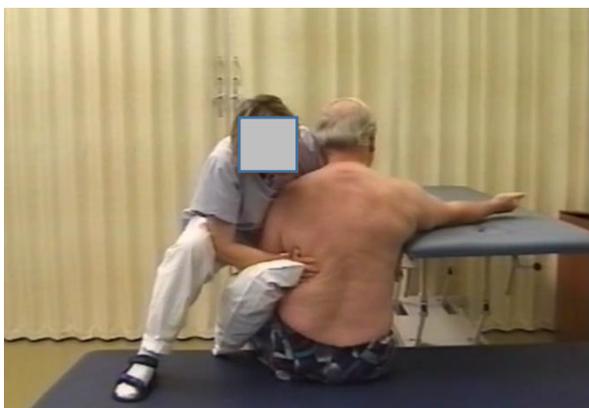
### **But only manipulation isn't enough.**

In the examples, that follow now, there is always an ADL included in which this movement can be use (photo 10 painting the wall), that part is important. Using through the day is essential !! Especially arm and hand exercise must have an participation through the day because otherwise the stimulus is too low. No use through the day and only in the therapy will never get in the brain an projection and will not mean that it is the same projection as before the stroke but another. To create that projection there must be an dimension of using, be there. To demonstrated what an performance some very skill therapist can do with the arm/hand of patients, we let see what high skilled therapist are capable in manipulation with an goal in this ADL area. We see here that every time there is an search for the best position of the joint with the best tone and create the optimal possibility for the individual with an stroke that the movement of the arm /hand can be so good as possible. Than we see the total therapy by starting with inhibition and stabilization of the lower and the upper trunk, the alignment of the diagonals and the keypoints, the stimulation of the muscles that are inhibit and the building from an movement with an purpose that the individual can perform with assistance or with manipulation in several chains. *The goal is an open chain when that is possible.* This must be the search for every therapist that works with stroke patients or other patients with neurological and orthopedic problems because working on this way will teach the individual how to move and how to solve an problem and get more possibilities. This has also an learning principle of searching for solution. Hands-on facilitation that lead to use the power and coordination improvement in the movement of the upper trunk /scapula /gleno-humeral joint elbow and finally the hand. Of course is this an form of learning but there must be an possibility that this is possible without the hands-on facilitation and that ask for increasing the power and the coordination. Therefore in the hands-on facilitation must be an goal that give the patient the reason for this hands-on facilitation and must be the goal for the therapist that this goal is also possible without hands-on facilitation after some time.

Hand-on facilitation asked for skills of the therapist that is very difficult. My own experience is that this has cost me 10 years for I feel it and had the skill to bring in the practice. That means that this must be learn by the therapist and that this must be stimulated as the highest form of therapy. Regrettably it seems that this is devaluated, still we see it by the therapist that use manipulation how important that skill are to get the result that we want.

### **Hands- on facilitation 1.**

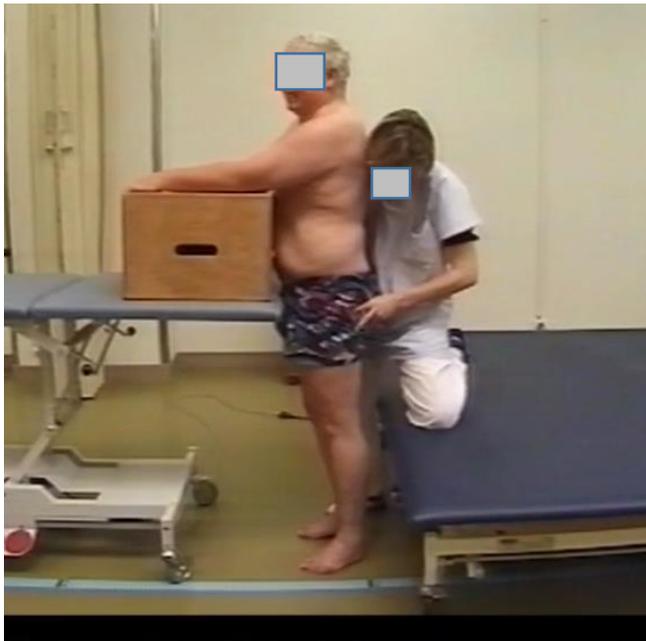
Man with an paretic side on the left side. This hand- on facilitation is more that only make the movement easier but also to inhibit the tone and create more mobility in the joints. Starting with the spine and ribcage, this is important because this will give the diagonals the possible to do their job optimal.



**Photo 10**

### **Photo 10**

Preparation of the trunk to get the tone on an lower level and make it possible that the affected side can make the movement that is acquired for an control over the upper trunk and scapula. The tone on the back is too high and inhibit the power in the front diagonal ( reciprocal inhibition). This is done by stretch on the tissues and observe the reaction on tone and flexibility of the movement. Photo 10 published with the responsibility and permission of the author by j.v.d.Rakt

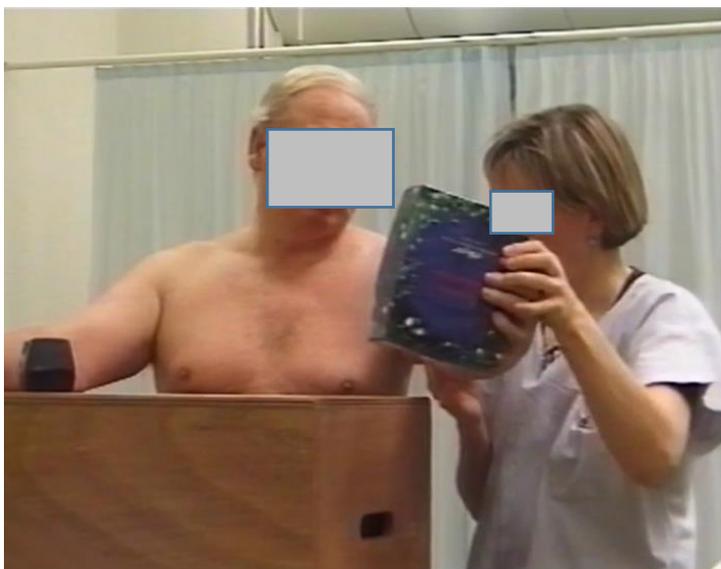


**Photo 11**

**Photo 11.**

After the preparation in the sitting position, now the preparation in an standing position. The stimulus for the front diagonal will be evoked by the standing position with the stimulus on the front and the therapist is now working on an facilitation of the pelvis . This is the base of the upper trunk and give more tone in the stomach muscles. The shortening of the trunk will be give an bad weight caring on the affected leg and that is treated because too much activity of the not-affected leg will stimulated the back diagonal –left –of the upper trunk/shoulder arm and hand. Photo 11 published with the responsibility and permission of the author by j.v.d.Rakt

The base is present and now the work can start to get an better movement and skills in the upper trunk and the arm and working to an activity of the arm and hand. Using an table ( closed chain) in front of him, the patient is capable to hold the tone in the front diagonal on the right level and that makes it possible that the movement of the scapula is restored and that the glenohumeral joint standing well in the cavity. Still the ( pathological)-synergy are present, but the base of the flexion synergy is the dominancy of the back diagonal from the not-affected leg. This will give the retraction but also the abduction and exorotation in the glenohumeral joint and flexion in the elbow. By decreasing the tone ( photo 11) makes it possible to facilitated the tone of the front diagonal from the not-affected leg to the affected arm. Still the other diagonal must also contribute in holding the lower trunk in the right position with the right tone and therefore leis the not-affected arm in an closed chain with protraction on the crunch and must the weight also on the affected leg because the only chain that was “open “is the affected arm . This open chain isn’t open anymore because through the facilitation hands-on is there an half closed chain.



**Photo 12.**

**Photo 12.**

Standing in the position of photo 17, now there is an possibility to carry an book from down on the bench up to crunch with an control in the scapula movement ( latero rotation) and anteflexion with endorotation and an grip on the object . The focus is very clear therefore an great motivation !! Photo 12 published with the responsibility and permission of the author by j.v.d.Rakt

The tone must be stay well and that will be trained by movement with that tone and that rehearsal will stimulated the system to an reciprocal inhibition through the active movement with facilitation. That means that the brain must create an solution to use the hand in an good way, that the book will go from the bench up to the crunch. This movement is an combination of anteflexion with endorotation and that are to opposite movement out the flexor and extensor movement synergy and ask both for an active shortening of the spine with the right tone in the front diagonals. Very important factor is that there is an lot of rehearsal with variation and goal directed and the possibility to do it with load to create more power and coordination.



**Photo 13**

**Photo 13.**

Now the hand has an total other function. He is holding the bottle and the other hand close him. But the action that the scapula, gleno humeral joint must make is almost the same only is there now no anteflexion but an control of the rotation that his arm stay on the bench. Hold the bottle can be changed in loose or grasp the bottle

Photo 13 published with the responsibility and permission of the author by j.v.d.Rakt

Two examples of an goal of the facilitation to stimulated the brain for searching for an solution. The endorotation in the gleno-humeral joint is in photo 13 together with anteflexion, but in photo 18 the main interest is endorotation and adduction. Both ask for an shortening on that side of the trunk but also for an adjustment of the scapula position. And is photo 13 an half closed chain because there also an hands-on facilitation, photo 14 is for the affected arm an closed chain. Hands- on can changed the chain not only the open in half closed but also dynamic. And dynamic means movement and in this example an goal directed movement, therefore the brain must search for an good solution.



**Photo 14**

**Photo 14.**

Holding an broom in this way will mean that the not-affected arm will do very much and it is the question of the affected arm can help but in therapy he is now busy on the affected side and with the affected side and with balance and walking and can he control the synergy ? To get optimal control the hand and underarm must stand in full supination and also the other hand, than both hand form an unity to get the job done. Still the weight is too much on the non-affected foot.

Photo 14 published with the responsibility and permission of the author by j.v.d.Rakt

Photo 14 give an picture of the question that many therapist ask : “ Preparation of the tone by manipulation, when and how I can feel, what is possible and what not ?

The answer isn't simple.

First the feeling cannot be learned out an book! How normal tone feels is an skill that ask for very much exercise and often isn't tone not normal but allow this improved tone better movement and that is the moment to try something out. But what is obvious that it isn't only an arm. The total body is part of the arm exercise and especially the trunk and the diagonals are very important and have always influence each other. When synergy has still an great part in the movements that will this part never be vanish and that isn't the goal for the manipulation, inhibition and facilitation. The goal must be that the movement is possible and that the individual feel and experience that he can do something with his affected arm and when he use this in the ADL or IADL than the progress will be great and improve further. There is only one way to learn this !

Do it and look to others and ask what the feel and ask to feel that too. But the most important part is , **DO IT !!**

Photo 12 can also be used to train this individual to lift the crunch bilateral. Still we ask for an endorotation ( part of the extensor movement synergy ) with anteflexion and an neutral stand of the elbow between pronation and supination ( part of the flexor and the position of the elbow is no influence of neither the extensor movement synergy or the flexor movement synergy ) Lifting an object with one arm is difficult. Therefore when an individual this can use, is this an possibility that often can transfer to the ADL and IADL. And the combination with task-specific resistance treatment is great because when the movement is possible than it is possible that the box is heavier, the book also, the can be give resistance against the upper arm ( photo 12) or the broom can be alter. There is only one rule the movement must be going on.

The power that is needed in the not-affected leg and arm to get the affected leg over the wooden stick is so big that the back diagonal started from the not-affected leg will created an very high tone in the remaining part of diagonal[19,20]. And that extension rotation will inhibit all possibilities of the front diagonal and will weaken this diagonal ( reciprocal inhibition[49]) further and therefore stimulated only the flexor movement synergy with an wrong position of all joint from scapula all away to hand and the impossibility to create in the arm/hand more possibilities will almost impossible because the tone will be so high and the release moment so little that the sarcomere will changed and the muscle will be shortening !

## Hands- on facilitation 2.



**Photo 15**

### **Photo 15.**

Assessment of the position of the scapula in an relax position. The affected side is right one and see the small difference in the position of the scapula. Greatest difference is that the lowest point and the margo medialis stand more from the thorax and the rotation (adduction) is more. Influence of the dominancy of the back diagonal in combination with loss of selectivity. The flexor synergy in the upper trunk and therefore also in the arm is dominant and the keypoint can have an poor dissociation.

Photo 15 published with the responsibility and permission of the author by j.v.d.Rakt

That means that the difference between the front and the back is not in an equilibrium! Holding the scapula against the thorax and placed the scapula in the right position is the work from both diagonal and in this cause the back diagonal seems to have more tone and inhibit the base tone of the front diagonal. Of course must there also be an good selectivity but the base is that no of the diagonals is dominant. Still the finer work asked dissociation of the two movement synergy ! When the scapula isn't in the right position than will the cavity of the gleno-humeral joint has problems to hold the caput in the right place.. This imbalance will be one of the reasons that the head of the gleno humeral joint will not stand in the cavity of the scapula and that lead to an subluxation inferior.[31]

Also when the woman (photo 15) lift their affected arm will the scapula first move in the spine direction (retraction), till there is an the stretch on the muscles that care for an protraction. Now often start the protraction musculature with their action and the optimal action isn't started but often we see that the scapula isn't close to the ribcage. The start and the movement after that is re-active therefore too late and the space between the head and the cavity will never be optimal and that can lead to little trauma on the structures in the head of the shoulder ( impingement [49] ).

Exercises will this vulnerable shoulder ask for an hand-on facilitation because otherwise the damage and the pain can be so large that the individual will prevent moving her affected arm and loose more. Therefore we must start will an treatment of the upper trunk and when the influence of the lower trunk is present than first with the lower trunk.( see hands-on facilitation 1) Start in an sitting position to get an normalization of the tone as far as possible because this tone. But in sitting position it is easier to get the tone and mobility on an higher level. In this case there is still an higher tone in the back diagonal than in the front diagonal and the firing from the brain is faster to the muscle of the back diagonal. That means the intention to lift the affected arm will always lead to an activation of the back diagonal that start from the fascia thoraco-lumbalis and an shift of weight to the not-affected leg. The base is now present and with the back diagonal start the lifting of the arm ( flexor extension synergy). The front diagonal receive no active signal from the brain or an signal to the back diagonal inhibit this, therefore when the muscle were stretch now will also the front system start to work but always later than the back diagonal system. Manipulation and hands-on facilitation must change that by inhibit the back diagonal activity and stimulated the front diagonal activity and that is possible by manipulated the muscles around the scapula and build up together the highest level of reciprocal innervation that is possible .



**Photo 16**

**Photo 16.**

Subluxation.

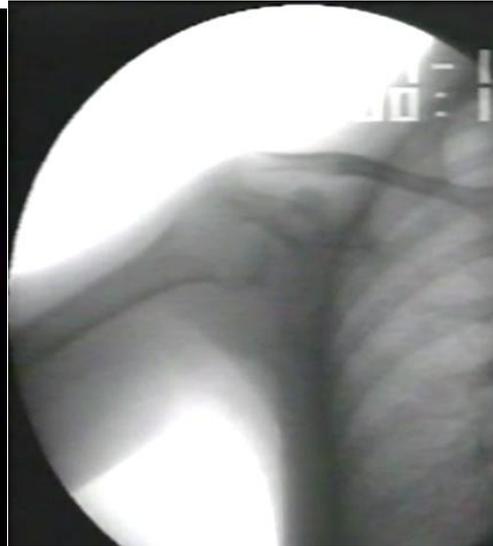
Look to the contour of shoulder and the acromion and we see that the head of the humerus stand too low. Between the acromion and the head of the humerus, there is an gap of 2 cm and that is an sign of an subluxation(inferior).

The position of the scapula is wrong –too much retraction and that give the control system not enough control and the caput of the gleno-humeral joint is losing his stand in the cavity.

Photo 16 published with the responsibility and permission of the author by j.v.d.Rakt



**Photo 17**



**Photo 18**

**Photo 17.** The subluxation of the head of the humerus. The cause lies in the position of the scapula. When this arm moves and the scapula isn't capable to move fast to latero rotation the head of the humerus will press against the roof of the acromion and this is an impingement with serious complaints. **Photo 18.** We see on an Röntgen-photo the correct stand of the caput in the cavity.

Photo 17 and 18 published with the responsibility and permission of the author by j.v.d.Rakt

It is therefore very important that the situation is changed, this therapist do it through manipulation, inhibition and facilitation. Inhibition of the high tone that give the retraction of the scapula and that is an part of the back diagonal but also by stimulation of the front diagonal to activated the muscle that give an active protraction and not an protraction that is provoke by an stretch on the muscle.

The hand of the therapist moves the scapula in the right direction and try the high tone to decrease and stimulated the muscle on the front to work together with the hand movement. Furthermore will this handling give an release of stretch and tone in the tissue around the scapula and give an better relaxation.



**Photo 19**

**Photo 19.**

Manipulation of the tissues/muscle around the scapula to get an better active protraction. Through that better protraction will the subluxation become lesser and is the danger of an impingement problem smaller. Now there can be an movement in the gleno-humeral joint take place without danger of pain and damage. The manipulation is starting with the hand of the therapist on the scapula and this starting with an stretch but also with good position of the scapula along the ribcage. As an reaction on this manipulation the gap between the acromion and the head of the humerus is gone. The head stand now correctly in his cavity. Photo 19 published with the responsibility and permission of the author by j.v.d.Rakt



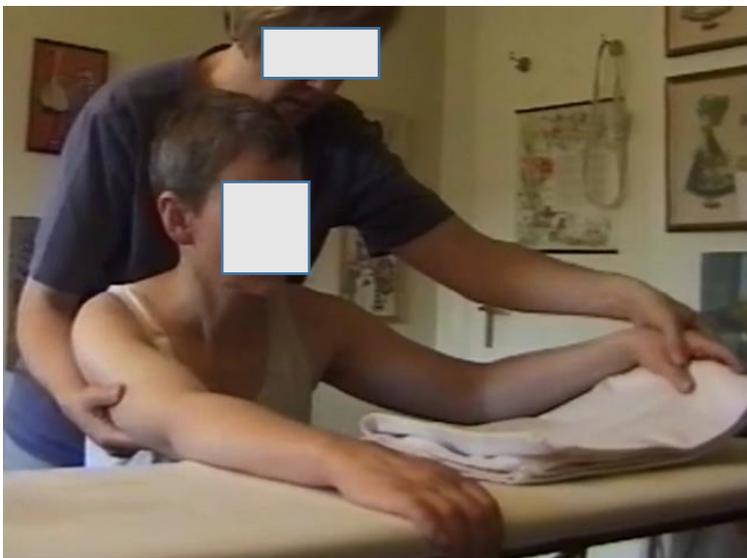
**Photo 20**

**Photo 20**

The movement of the shoulder is now partial passive possible with no pain. Still this isn't an movement on their own because she must to much use the synergy to get the arm on the ironing board. With the best rotation in the shoulder joint the therapist will give room on the individual to participated in this movement. First passive to feel that the movement goes smoothly and no pain occur than the active performance can start.

Photo 20 published with the responsibility and permission of the author by j.v.d.Rakt

The learning process of passive movement isn't great but in this case it is very important that the alignment between the trunk ( upper and Lower) scapula and gleno humeral joint is restored because otherwise will an activation maybe give pain and damage and then the individual will avoid movement in this joint. But when the arm lay on the board the therapist is working on an goal. The affected arm has an support function and the other arm and body has now more stabilization can do something in an open chain. The affected arm is now in an closed chain. For the individual is it now important that the affected arm stay right on the board and allow the not-affected hand to work. When that is going well than will the next step an increasing of load on the not-affected arm/hand because that will ask for more stabilization in the affected arm .



**Photo 21**

**Photo 21.**

The affected arm has now an stabilization function and look to the head of the shoulder and see how perfect the head of the humerus stand.

The therapist hold the arm to ensure that the position stay correct and feels which muscle reaction take place. Even here standing position behind the individual is important.

Photo 21 published with the responsibility and permission of the author by j.v.d.Rakt

The position of the therapist behind the individual make it for the patient very difficult to use the back diagonal by extension of the head. Because that reaction will enter the whole alignment. From this point she can exercise on different levels and be sure that the alignment of the shoulder is perfect and that there are no complaints . Through the feeling that the arm can move without pain and that this arm can also use as fixator also without pain the confidence will return and the patient will be stimulated to use their arm/hand again.

### Hands- on facilitation 3.



**Photo 22**

**Photo 22.**

This lady with an status after an stroke on the right side is lifting her affected arm and we see that there are elements of the flexor movement synergy but that there is an lot of dissociation in this open chain movement. Flexor movement synergy elements are the extension in the upper trunk pointing at an dominancy of the back diagonal but there are an lot of dissociation elements and here hand has extension in the fingers.

Photo 22 published with the responsibility and permission of the author by j.v.d.Rakt

*Flexor movement synergy elements ;* Extension rotation of the upper trunk ( back diagonal dominance ) this inhibit the whole movement of the scapula over the ribcage to the front. Now we see that the lateral edge of the scapula stand by the entrée of the axillary cavity and this must normally further to the front. The elevation is present and we see also an elongation of the trunk on the affected side and that will be an elongation that is done by the back diagonal that lies along the spine and that means that the angle up is greater than 45° and give an insufficiency of the keypoint on the front to make this elongation an anchor for the movement of the scapula to the front and make it possible that cavity of the gleno humeral joint is well in position[19,20]. In the gleno humeral joint there is abduction with exorotation (elements of an flexor movement synergy). The elbow has some extension but cannot go to full extension. Therefore there is here an lot of dissociation between the two movement synergy. At least in the wrist and the hand there are more movements possible as in the movement synergy often is present, that pointed that the cortical pathway has still possibilities. An hand that is capable to grasp and hold and release will give an great contribution to train the whole arm because the hand as last part in the arm is the most important part of the arm.

Important is now, how to change the dominance of the back diagonal closed along the spine more to lateral and to the front, because this will lead to an better movement of the scapula and will place the gleno humeral head better in his cavity and maybe will answer the muscle around the gleno humeral joint than better. The dissociation between the two synergy will often stimulated the small muscle around the shoulder. Sometimes the dominance of the synergy muscle inhibit the small one but when that is broken, their activity is there. This can only be discovered by inhibition of the synergy and diagonal and facilitation of the movement in the shoulder.



**Photo 23**

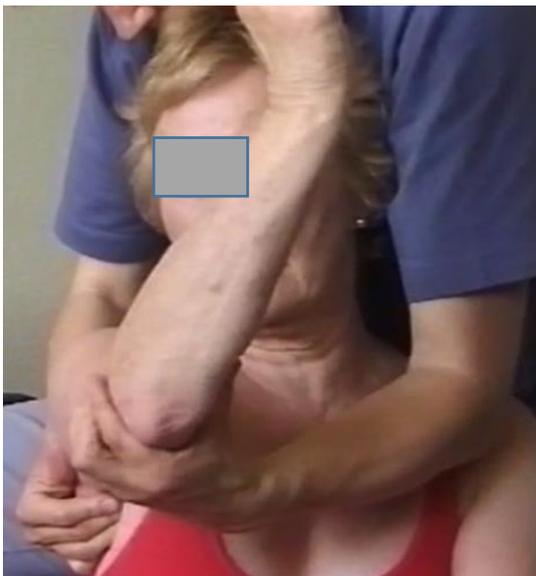
**Photo 23.**

The manipulation start in an standing position. That means that the balance will help and there is no flexor movement synergy stimulation.

Using the standing position it is now easier to transfer the weight on the affected leg and stimulated the homolateral keypoints shoulder and hip and get so an active elongation on the affected side.

Photo 23 published with the responsibility and permission of the author by j.v.d.Rakt

Very important choice( standing position) that will help not only to get an better elongation but also make the inhibition of the back diagonal near the spine better but give also an translation of this diagonal to the lateral. By manipulation of the scapula to the front the movement of the scapula will be better and the change that the front diagonal will help on an higher level is also present. Placing the scapula to the front and holding with an slight arm movement will stimulate the front diagonal not only close to the mid of the stomach but also further lateral and that will create an position of the scapula must further to the front and with much more latero-rotation. And that again allow the gleno humeral joint to make an greater movement to anteflexion. Here are possibilities to give this activity load that can contribute to an increase of power and coordination in the muscle of the upper trunk (- back-front-homolateral ) scapula and the gleno humeral joint. That again lead to more dissociation and will be also present in the rest of the arm and hand.



**Photo 24**

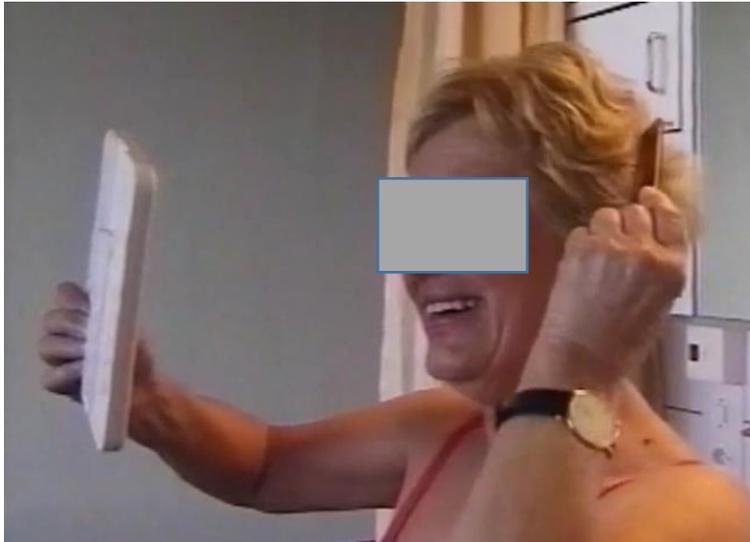
**Photo 24.**

Here is prefect to see what the manipulation had achieved. The gleno-humeral joint stand now in an 90 ° anteflexion and almost full exorotation without abduction and pay attention on the position of the wrist. Still no open chain but the support of the shoulder of the therapist is enough to achieve this. Look to the “form” of shoulder, there is no sublaxation and the position is good. This almost end- exorotation is only reach when the position of the caput is good in the cavity and this position is very important and asked for small muscle activity to achieve and hold this.

Photo 24 published with the responsibility and permission of the author by j.v.d.Rakt

One hand of the therapist hold the upper arm in an right position but the other arm goes further with scapula and this is now almost on the front barrier of the axillary cavity and that stand normal. In the

starting position (photo 22) the scapula stop at the axillary cavity start at the back, now with the same amount of anteflexion without abduction he stand on the front barrier of the axillary cavity. The fingers of the therapist are around the lateral edge of the scapula and an little stretch will activated the muscle on the front and load increasing is possible by asking the individual to take over the weight of the arm and holding this arm in this position. Now it is important to find an goal and see what the therapist has found as an goal: Hold the mirror to see properly in the mirror and then is this position with much exorotation is very important, Brilliant !!)

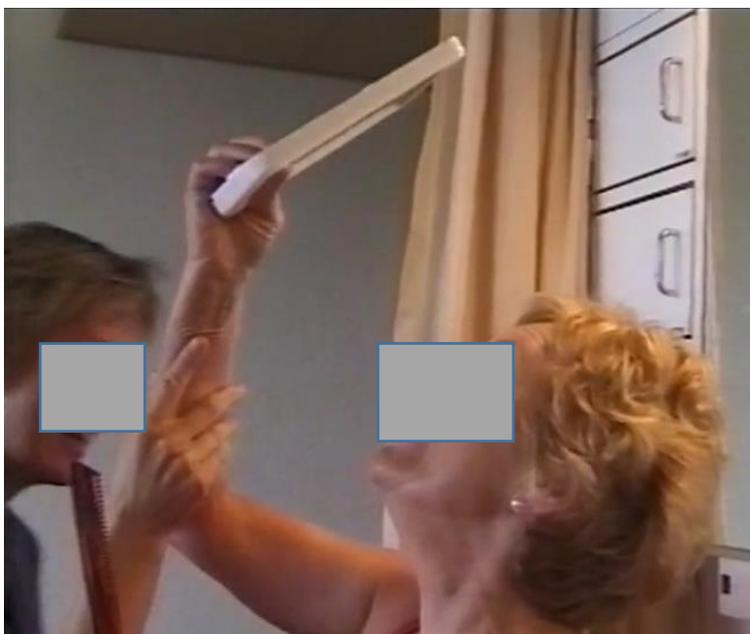


**Photo 25**

**Photo 25.**

Holding an mirror gives the individual the possibility to see what is happening with the comb through there hear.

Of course we see that holding without support isn't easy and that is an heavy task because she must do two things together but the mirror stand on an place that is important . And what can achieve more after this ?? Photo 25 published with the responsibility and permission of the author by j.v.d.Rakt



**Photo 26**

**Photo 26.**

After this again the manipulation start with the goal to get the mirror on higher level. Therefore it is important that the exorotation is again complete because than stand the gleno-humeral joint so good that the most space is available in the joint and when the scapula stand well the shoulder muscle can help to get more anteflexion.

Photo 26 published with the responsibility and permission of the author by j.v.d.Rakt



**Photo 27**

**Photo 27.**

After the exercise to lift the mirror higher and see more of the head. The next step is to hold de anteflexion with great part of exorotation but now also with extension of the elbow with more supination and with the fingers in an extension to make an reach movement . The base is still very important. Photo 27 published with the responsibility and permission of the author by j.v.d.Rakt

Again the manipulation has created a situation in which the inhibition is lesser and then there is the possibility that other muscles-chain can contribute so that the movement of the shoulder is far more better and can be used to get the mirror so high that the individual can see well what she is doing with the cam. The joy on both faces say that this achievement is great.

**Hands- on facilitation 4.**

Standing in an relax position the difference between the left and right shoulder is clear present.



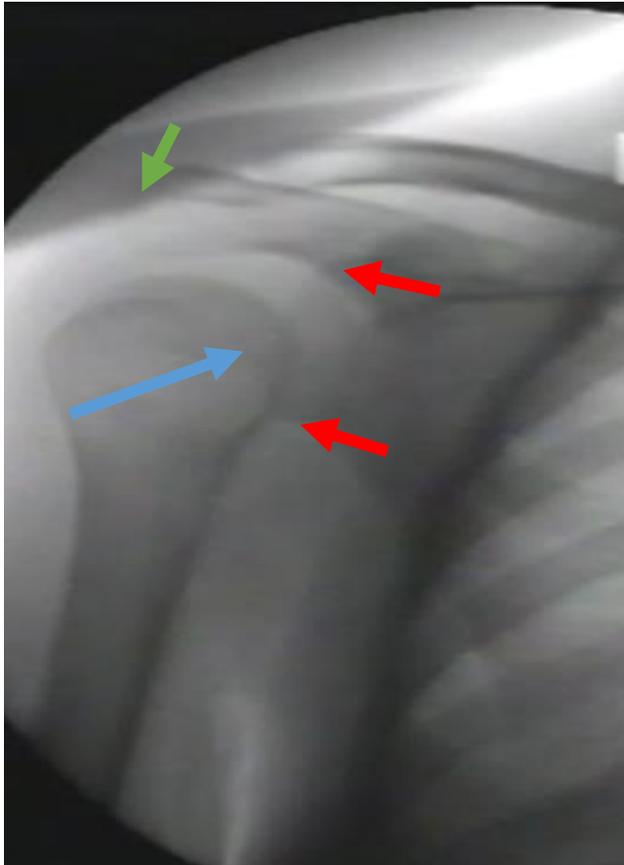
**Photo 28**

**Photo 28.**

We see on the left side ( the not-affected side ) no “gap” under the deltoideus muscle and the margo medialis of the scapula isn’t visible. See now on the right side (affected side) the “gap “is clear but also the margo medialis of the scapula. This margo is coming of the ribcage but also the stand the most inferior point of the scapula more to the spine. That is an sign that the tone of the muscles that give the retraction are dominant. That is an part of the back diagonal from the not-affected leg to the affected arm[19,20]. Not totally visible is the weight bearing on the feet but it seems that the weight is slightly shift to the not-affected leg. The position of arm and shoulders are almost identical. On first side no great difference between the two side after an stroke. This position of the scapula gives an sign that the back diagonal and especially the part closed by the spine is dominant. The question that we must ask ourselves :” Has this dominance inhibit the homolateral and front diagonal structure /tone/ selectivity or is this the maximum what the brain can ?”

Photo 28 published with the responsibility and permission of the author by j.v.d.Rakt

Often is the system capable to more but then must the dominance of the diagonal closed to the spine be inhibit and must there an stimulation of all other structures. Including the more lateral part of the back diagonal and the homolateral and all part of the front diagonal. Till now it isn't 100% sure what the subluxation caused[50,51,52]. Is it the loss of muscle around the head of the gleno humeral joint (especially the muscle deltoideus ) or is the contribution of the wrong position of the humerus cavity (scapula) the greatest cause or are an lot of combination possible. Subluxation will be an spoken in other article [53]



**Photo 29**

**Photo 29.**

What we see on this Rö – picture ?: The head of the gleno humeral joint and the cavity for this head of the humerus . The head of the humerus stay on the lowest part of the cavity and leave the upper part free. The room between the head and acromion is very great indicated that this is an subluxation of the humerus head. Humerus head – Blue, Cavity ---- red, Acromion ----green arrow .

The part that touch the edge of the cavity on the underside is an large part. Still this isn't often an reason for pain but well of an feeling van discomfort when the arm is along the body without an support. This is de starting position of her shoulder (Photo 28) and there we see almost nothing but on the next photo (30), we see more and image what the caput does than !! Photo 29 published with the responsibility and permission of the author by j.v.d.Rakt

She start to get their affected arm so high as possible and she start with both arms (photo 30). Notice it start with extension of the head and that means that the part of the back diagonals closed to the spine were set to work on both side and the greatest power will be achieve on the not-affected side and will change the weight bearing. The difference between left and right is now very good visible. On the right there is an movement of the scapula almost totally in elevation but also in latero- rotation and the trunk is there extreme elongated. But the tone of this not-affected side is also use to create an anchor for the affected side . Otherwise there was no elevation of the scapula possible. That means that the elongation of the affected side is done through an shortening of the not-affected side. There – on the not-affected side- is the greatest muscle action. Left the shoulder stand in exorotation but not on the end with anteflexion and the scapula stand against the ribcage. Right -the affected side-; the margo medialis is very good visible that means here is an elevation with some latero rotation but the upper part of the scapula stand closer to the spine as on photo 28. The arm goes not in anteflexion but in abduction and with an exorotation with an flexion of the elbow. An flexor movement synergy purr sang !!



**Photo 30**

**Photo 30.**

Lifting their affected arm she do it with an flexor movement synergy. And therefore she need the not-affected side for an anchor. The affected side cannot give this anchor because the lateral part of the back diagonal work not together with the front diagonal to hold the scapula against the ribcage. To lift the affected arm she must first create an anchor and she find it in neck area that is fixated through the not-affected trunk side all away to the cervical spine. Through this anchor the scapula moves in elevation and the latero-rotation of the scapula is too short because the frontal diagonal has no answer through the inhibition by the back diagonal.

Photo 30 published with the responsibility and permission of the author by j.v.d.Rakt



**Photo 31**

**Photo 31.**

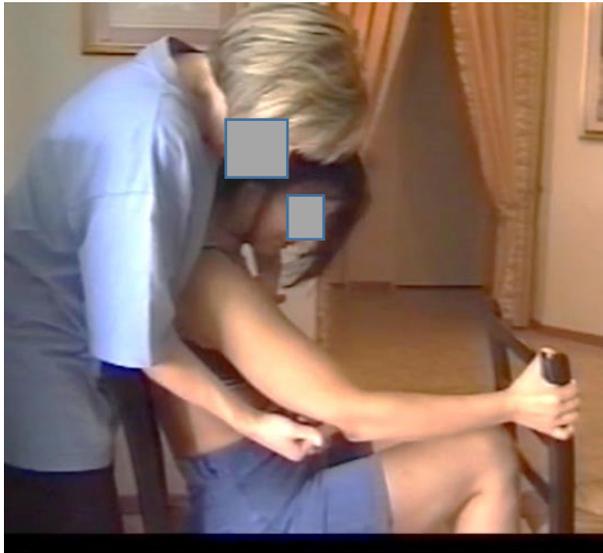
She try to get the arms so high as possible but this gives more abduction gleno humeral and especially more exorotation with elbow flexion and flexion in the wrist and fingers. The hand is higher but not through anteflexion but though exorotation, an part of the flexion movement synergy. But compared the place of the scapula is there more difference ? No, only the whole shoulder girdle is more in retraction with the head more in flexion. The system is blocked. The scapula cannot change his position and stay near the spine especially on the top. See the difference with other side.

The power that she seeks, find she in the synergy, but the "fixation "of the scapula is very great. Now the active back diagonal from the not-affected leg to the affected leg is visible. Even the tone increase of the buttock on the not-affected side and an slight weight shifting take place. This movement will be when this is the only one be an fast pathway in the damaged brain and will dominant. This has no sense because the inhibition of this synergy will be great and we must seek for an form of dissociation.

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The affected side stay is still in an elongation and that means that the homolateral and front diagonals cannot correct the placement of the scapula. **Is this all she can?** The answer is inhibition and facilitation/stimulation of the other structures and see what the reaction is of the muscle-pattern and therefore the damage brain. Important is that the effort she makes to lift the arm is so big that only an flexion movement synergy the only movement is, therefore search to another movement and use an

closed or half closed chain with or without dynamic. This movement let us not see what here dissociation possibilities are.



**Photo 32**

**Photo 32 .**

Start with inhibition of the back diagonal and especially the spine part by elongation of the spine and increase the length in this muscles and on the other hand start with facilitation of the scapula movement to the front and stimulation of muscle of the stomach . That give the muscle that gives protraction an anchor. The creation of an inhibition of the tone of the back diagonal and at the same time the stimulation of the front diagonal is the principle of reciprocal innervation[47].

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The effect must be that the elevation and the extension of the head isn't used anymore, that the stiffness of the muscles that gives that elevation and hold the upper part of the scapula so tight against the spine will loosed. When this is done the therapist use this difference to ask for more action in the homolateral and front diagonal so far as possible on the lateral side of the body and give an goal with load. There is an chair that is used as an closed chain but this chair can be set on two legs (the front) and she must push to hold the chair there. But also the distal part of the front diagonal can be used to stimulate the tone and the power of the front diagonal by lifting her affected leg to the stomach and hold the feet from the floor and that can also against resistance. And achieve that, the goal is alter in an reach movement to grasp an towel and use the ability to control the scapula and the therefore the wrong elements of the flexion movement synergy.

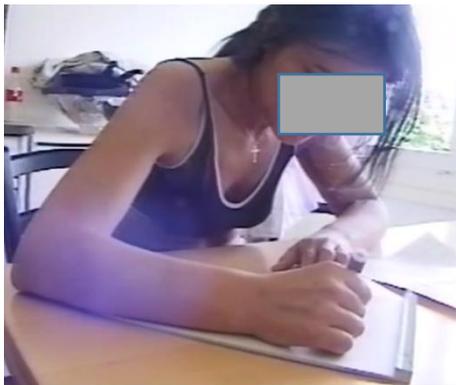


**Photo 33**

**Photo 33.**

Reaching will increase the load. This is done with an full extension in the elbow, inhibit both synergy and placed the scapula in good position and makes an further dissociation possible. The goal is to pick up the towel and lift to the table. That towel can be replaced by something with more load but be careful, she goes fast back to the flexor movement synergy. And see the possibilities of the hand, here is more possible !!

Photo 33 published with the responsibility and permission of the author by j.v.d.Rakt.



**Photo 34**

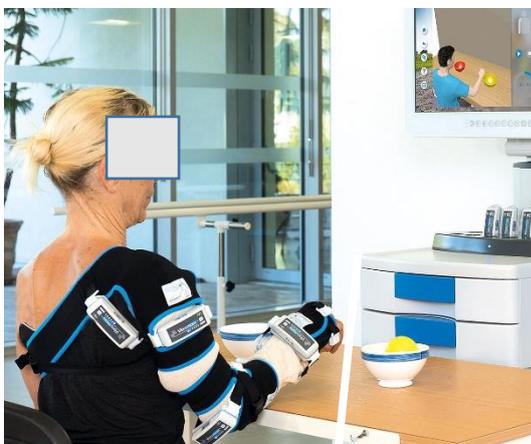
**Photo 34.**

Beautiful goal. The goal is writing and that is an master hand function but asked for an good control of the arm and the upper trunk. Now must she make careful movements to be able to write . The scapula stay in protraction by the closed chain of the upper trunk that end in the affected elbow. Here no support task for the affected hand but the important task – writing with the affected hand !!

Photo 34 published with the responsibility and permission of the author by j.v.d.Rakt

The combination between dissociation treatment and tone /tissue mobility makes the difference, but this asked for an treatment that asked for an therapist with special skills. Feel that the tone is decrease and that not-contractile element are not inhibit anymore are so important. That skills must be train through the therapist and is the difference between the master and the student and that makes an physiotherapist an specialist on the area of neurological diseases. Neurological methods are always searching for this direct influence on the tissue that is affected through the brain damage and indirect are the capable to get in the brain an reaction to get the performance on an higher level.[30,31,35,54,55,56,57,58,59]

**Hands- on facilitation 5.**



**Photo 35**

**Photo 35.**

A novel approach that facilitated the sensory, is the “Vibramoov” that gives vibration[60] on muscles and through this vibration is there increase in sensory input. This apparatus is attached above the muscle and can be use in the treatment of arms , legs trunk. The result are still difficult to place because most people that may use this apparatus are the people in the rehab. Centre and often with an good prognostic. Still this is one the first apparatus that is develop to get an better perception.

Photo 35 published with the responsibility and permission of the author by j.v.d.Rakt

**Conclusion**

Hands-on facilitation is very difficult and ask for an lot of knowledge and skill, but every therapist can do it and the best way to learn it is, by doing it and look at others. All exercises can be done with facilitation, manipulation and it must have an greater advance and contribute in the learning of “new” movement and controlling the tone and an greater dissociation. Is there an border, as many therapist say, no, time is or cannot be the border. The combination of knowledge and skill will give more possibilities than many therapist thinks. The seeing of the total body with the diagonals makes it obvious that there are so many aspects that can contribute by the finding of dissociation and with an

learning of an wanted goal in the ADL or IADL this skill will be used by the individual and will be an structural change. That means an change in the brain !!!

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