

First ABR Evaluation 19 April 2004 – Leonid 'Blyum:

When you have next hip x-ray done, ask for an X-ray that includes the lumbar spine up to the lower ribs.

The legs do not hang in the air, they are the dependants of the pelvis.

It is essentially the deformity of the pelvis that causes the distortion of the legs.

Gegi's hip X-rays: Iliac bones and lumbar spine look like one white, blurred mess.

If you look at an X-ray of a healthy person, every single vertebrae should be properly articulated, there has to be a distance between every vertebrae and disc. The vertebrae would look white, the space in between should be black. The edges of the iliac bones should be clear on the X-ray.

When we start ABR, his legs are going to be changing a lot, they will be swinging wildly all over the place, because the transition of the pelvis is going to bring about the transition of the legs. His legs at the moment are far from optimal.

Before we can get to the point of stabilizing the legs as legs, the key part is to understand the transitions of the pelvis.

It is a chain reaction - it means that if you want proper alignment of the legs in the pelvis, you must first have proper alignment of the pelvis with the lumbar spine. The construction of the pelvis itself - the alignment of the 2 iliac bones and the sacrum - has to be correct

Gegi's anterior abdominal muscles have a very unusual shape. He has a vertical split between muscles, which is unusual.

His skin very loose, it can be moved around a lot, it looks as if he has too much skin.

Gegi's hips were dislocated since he was 2,5 years old.

The spasticity has improved in the last 4 years, since doing the IAHP intensive program. He has no pain in his hips.

The legs are inserted in the pelvis. Because the pelvis itself is distorted and underdeveloped, where would you insert the legs?

Have we been offered hip surgery?

Vienna orthopaedic surgeon said when Gegi was 4 years old that he would operate when Gegi is about 12.

The skin is the map that gives you an indication of what kind of intrinsic volume should be under it. The skin should normally match the segmentation or compartmentalization that is under it – which means that the skin that belongs to the left side must be on the left and shouldn't be on the right. On Gegi, the skin on his ribcage can be moved up and down the space of 5 ribs. The nipple can be moved all over the place. This shows that all the connective tissue bands that divide the body into different compartments have collapsed. The transition of the skin quality (extra skin thickness) and reduction of the skin mobility are essential processes that we are going to see with ABR.

When you see a new-born well child, you see more or less a non-differentiated volume – the chubbiness of a baby.

Later on, the density increases, there is a higher percentage of muscle in the body.

Gegi has a rigid skeletal frame and missing levels in between.

The first thing to do is to start to recover that integration between the legs from the core to the periphery. In order for him to progress radically, he has to boost in size, lengthwise, widthwise. His size at the moment has nothing to do with the number of calories that we are giving him. Today, he is like a bird, a lot of food in, a lot of food eliminated. What we should see is the opposite, he has to start absorbing, and not just consuming and eliminating. On the one hand, the fact that he has no problems with constipation or diarrhea is excellent. He is eating and swallowing well.

Without the boost in size of volume, etc, everything else will just be a distribution within the limited capacities.

Essentially (obviously we have a very interesting boy), we can split things into several directions or lines.

Line 1 is the development of segmentation. The worst, or the primary thing that he had from the beginning, and that he still has, is the fact that his primary movement is the backwards motion of the head. Whether he is sitting, lying on his back, whether he is prone and trying to sit up, the way he initiates any movement is by making some pre-movement back- and upwards with his head, and only after that does he make any other movement of his body. Even turning his head to the side is not a pure movement to the side along the vertical axis. At first, he tilts his head backwards, and only after that does he add the sideways movement.

If you look straight at a well child, you will see his head is tilted forward so that you can see the front part of the top of his head, and the primary movement of the head is left and right along the vertical axis.

All Gegi's movements are based on the posterior tilt of the head.

Respectively, this posterior movement causes a lot of other things. The posterior tilt of the head inevitably sets the distortions of the neck, the distortions of the neck convert into the bulge of the anterior neck forwards, which creates a chain reaction for the rest of the body.

The essential starting point of ABR for Gegi is changing the orientation of the head and getting rid of this primary movement (posterior tilt of the head.) What we should see as a positive tendency is the change from his "stargazing" pattern (posterior tilt of head).

When he is sitting, he should spend more time looking downward. If you put a vertical axis through the top of his head through his skull that includes his entire neck, it would only be possible if his head is tilted forward. This is the basic primary vertical axis. If his head is up and you put a vertical axis through it, it would not include the entire neck.

The first movements that we should see (that correspond to the first stages of development in a well baby) are the movements of the head to the left and right along the vertical axis (like turning your head from side to side when you're saying no).

After starting ABR, Gerard's head control (his ability to lift up his head and then move it to left and right) might deteriorate. He will still be able to do it, but he may do it less frequently, because he will be spending more time with his head down.

This is vitally important: what he has to do is to lift up his head using the muscles of the back of his neck, with the vertical axis through the head and neck, and not lift up his head by just tilting his head backwards. This will mean true alignment of the head. So,

the first thing is to get rid of the backward tilt of the head. This will bring about the elongation of the posterior neck. In Gerard's head control, he uses the lateral muscles of the neck and tilts the head backwards.

What needs to happen is for the back of the neck to release, this release will cause his head to be able to drop forwards, but at the same time expanding the height of his posterior neck. At the same time, he will be able to move his head from side to side while his head is down much more often, and then gradually the head will be able to be held upright. The last movement to develop is the tilt to the right and the left, which is much more complicated. Gerard is not able to move his head laterally at the moment. When he is put into any off-balance position, he doesn't use his neck to counter-balance. Whenever we move his trunk, the movement of his ribcage immediately translates into the movement of his head.

If we tip his head forward, his chin touches his trunk just above the nipple level. The point of contact (in every well person) should be about at the level of the clavicle.

In sitting (on the edge of the table) Gegi has two basic patterns. When he moves his head back, the backwards movement of his head immediately translates into the stiffening of his lumbar spine and he slides forward on his bum. The opposite pattern is a collapse of the body when he bends forwards.

When his head tilts backwards, his shoulderblades automatically go up. His shoulderblades are lateral (sticking out at the side of his body) instead of being posterior. The shoulderblade has shifted up and the top of the shoulderblade is at the level of C7/T1 (the first vertebrae), and should be at the level T4 (fourth vertebrae).

What complicates matters in Gegi, is his ribcage distortion. Normally the attachments of the muscles basically follow the facets of the structural,,,.? On his back, you see no segmentation between his left and right side. Even looking at his skin, you can't tell where the left side starts and the right side ends. Similarly, the vertical segmentation is extremely poor. His entire vertebral column is practically fused. What we saw on the X-ray as a white mess, is that the space between the vertebrae has been significantly reduced, therefore his entire vertebral column, his entire ribcage performs as one rigid unit.

Francis said: "Can that be changed?"

Yes, that can change, it is not a problem, but the fact is that underneath his outer structure there are many asymmetries that are sort of buried.

If we look at Gegi's back carefully, the right side and left side look different. At the moment it isn't very obvious. But with ABR the intra-discal and the intra-vertebral spaces are going to increase when the bio-mechanical mobility of his back improves. Today, if he is moved in the lumbar spine (lying on his back, taking his legs and moving them as one unit from left to right), his entire body moves (he cannot move his legs on their own, but his whole body moves with the legs). If he is moved from left to right, by holding him under his arms, his whole body, including his legs, move together with his torso. If he is held by the pelvis and turned from left to right, the whole body also moves. When the

body is so rigid, the difference in structure between the left and right side of his body is not so obvious. In order for his body to be normal, he has to be able to independently move single parts of his body 100% to the left and to the right. At the moment it is about 0%. Unfortunately, improvement of the mobility of his structure will not happen spontaneously. In the future, the mobility of his structure will improve differently on his left and right side. For instance, his left side might improve 20% and the right side 40%, so the result is that he is going to look severely crooked. Even though he will have more mobility of his structure each way, he will look worse, and the crookedness will become more apparent. It is as if we will be looking at him through a magnifying glass. At the moment, if you look at his back while he is lying on his side, the vertebral column (looked at from his left back across to his right back) should be alternately convex, concave, then convex, which shows the segmentation between left side, centre and right side. In Gegi there is no segmentation. This means that all the joints connecting the vertebral column with the ribs are practically fused. The lateral facets have to get more volume, and once that happens, you will see that they are far from properly aligned. Again, we will see the asymmetries. At the moment the asymmetries and weaknesses are buried under his rigid outer structure. When we start working on strengthening his structure, first it will bring expansion to his back. From the rhombus-like shape that he has now, he is first going to open up, so we will start seeing some division between left, centre, and right. Physically speaking, there will be some accessory mobility appearing into the costal-vertebral (?) joints, where the vertebrae connect with the ribs. Then the difference between the left and right side of his ribcage will look more dramatic. We have to restore the mobility in every single vertebrae. When the rib cage and vertebral column is fused, it is not demanding, it just moves as one block. Once the mobility of his structure starts appearing, it needs to be able to do just what his head should do, first turning to the left and right, then forwards and backwards, then left and right tilting, and then combining every movement together into full three-dimensional mobility. All these planes have to be worked through at every single level. It is not as if we are going to create extra asymmetry, they all exist, but they are hidden under his rigid outer structure.

If we zoom in on him now, the right side of his back bulges more than the left side. If you touch him on the right of his spine (the spinal spondylosis?), you can feel that there is no division, but if you feel on the left side of his spine, there is slightly more of a depression. (that is because his left upper body is more mobile and he can use it better). If you touch him between his ribs, you will feel that his intercostal muscles are very tight. That is the reason why he is not growing and not gaining weight, because everything is pulling in. When he achieves a boost in growing, building up the tone, building up the mobility of his structure, we are going to see plenty of asymmetries, and that will not look nice. I am telling you this now, so that you will be prepared for it.

Gerard's case is not incredibly difficult, theoretically speaking. The most important thing is that he is co-operative, and that the parents have a decent work ethic, the rest is irrelevant. An important factor is that Gegi has good general health. therefore the management issues are not difficult.

Part one is improving the head and neck's function and structure, even though the bottom half of his body may as a consequence do a lot of zig-zags.

Part two is segmentation. If the bio-mechanical mobility of his structure (segmentation, rotation, etc) is improving, that means that we are moving in the right direction, even though asymmetries might look worse.

Parents often say: "My child was stiff and arching, but at least he looked straight. Now he is not arching, but he looks terrible."

As a lay person, we are brought up to view posterior-anterior (back to front) abnormalities as less important than left and right asymmetric abnormalities. Left and right planes are actually secondary to the anterior-posterior planes.

The cut of the open-heart surgery is an added problem. It means extra effort to restore the proper structure, because the normal division of the sternum - at the level of the joints - has been cut.

If you look at a well person, if you put one hand on your sternum (breastbone), and move the left half of your upper body, the sternum will stay in the same position. The front of the torso is divided into 4 segments, side left, left centre, right centre, right side – and the same on the back, so the whole torso is divided into 8 segments that can move independently. If we look at Gegi when he turns his body, he pivots as a block, he has no internal division. This bio-mechanical mobility is based on 4 connections – the sternal-costal joints: connections on the left front trunk, connections on the right front trunk; and costal-vertebral joints: connections on the left back trunk, connections on the right back trunk. These connections give mobility to the trunk – vertical and horizontal mobility of the trunk. When there is an intact anatomical element underneath the outer structure of the body, even if it is underdeveloped, extracting it with ABR is much easier than when it is artificially distorted (cut from open-heart surgery). In this case the normal integrity of the sternum has been compromised.

Normally in a child with an open ribcage, the response from that level will generally take longer, because you have to work through those deficiencies. The recovery will happen level by level, because obviously the sternum itself is not a single unit as well. Looking at Gegi now, he has what artificially looks as depth in his trunk, if you look at him from the back to the front in cross-section (the shape of his trunk looks more like a vertical oval). Because the ribcage didn't heal properly after the open-heart surgery, his breastbone and ribcage on his front juts out in a triangular shape. But essentially speaking, this is like one level below a bad case. So initially, his trunk is going to get wider from side to side, but he is going to flatten up from back to front. If you look at his trunk from the side, the top of the trunk is miniscule (just below the neck) and his breastbone bulges out in the middle.

A person can not have proper mobility of the arms without the proper alignment of the entire shoulder girdle. In order for the arms to move properly in the shoulder joints, you need

a) stable clavicles, connected properly and stably with the sternum (Gegi's clavicles are rotated upward and out (not just vertical instead of horizontal). The clavicles are joined in 2 places, at the sternum and the shoulder blade, so there are 2 pivots for the clavicles. In a well person, the end of the clavicle sits on top of the sternum, but Gegi's have rotated so that the ends are behind the sternum, as if the

clavicle has slipped behind the sternum. As a result of this, this connection with the sternum is very weak. The next connection of the shoulder blade with the clavicle should be a strong connective point (almost like a bump), but Gegi has a big dip there, which means that the connection is also weak. Your movement of the arm here in the shoulder joint is based on the stability of the joints of the clavicle with the sternum, the clavicle with the shoulder socket, and the shoulder blade with the clavicle. In Gegi, the shoulder blade has shifted, the clavicle has rotated up and out. The principle of the ABR program is extraction, widening and so on.

In Gegi's case, in the past 4 years, we have been looking for functional achievements – another 2 metres, another 4 metres, etc. However, function can determine structure only to a certain extent. Function, in that case, actually uses the available compensation within the limitations of structure. Simply speaking, no matter how much you crawl, you are not going to move the shoulder blade from being severely tilted upwards and out, to being into place. If the clavicle is in, it is in, no matter how much you dance around it, in the sense of asking him to do something. Any of his self-generated activities are not going to change the essential structural abnormalities.

With ABR he is the recipient of the therapy. We are dealing with the involuntary levels. When we are dealing with the involuntary levels, the only thing that matters is the quality of the response. What allows me to be so direct in predicting the future, even though the children are different, is because I know that we are dealing with involuntary levels. If we were dealing with voluntary levels, training something, there would be a lot of question marks. But this way, these are the structures that we want to address, this is your technique, there are no mediators in between. The response that we are dealing with, belongs to the deepest levels, most primitive autonomous levels of the central nervous system. If the child has enough brain remaining to breathe and digest, that means that there are no limitations for recovery. In Gegi we have to restore the different facets of his trunk. If you look at the muscles, they are attached to specific places, but it is not just the exact bone or rib where they are attached to that is important, the orientation is also important. If the orientation changes, then the entire vector of the muscles is completely different, so things would move in the wrong direction. In Gegi's case, he uses the anterior muscles of his neck, which are designed for flexion (contracting), to assist extension (stretching).

The legs are another tricky issue. At this moment, Gegi's left hip is dislocated. What this means, essentially, is that his leg kind of moves separately from the pelvis. If you look at the X-ray, the leg is not under the roof of the hip socket. But still, the important thing to understand – even if it is not under the roof, the joint capsule is still a continuous thing.

Every bone is wrapped in a sheath, and that sheath is continuous. You have the iliac bone of the pelvis, then there is a joint in between, then the femur head. This tube is uninterrupted, even though the femur head is not matching up with the pelvis (iliac bone), but internally they are still part of the same tube, which is a good thing. If you look at an X-ray, you get a different perception, because you look at the bones separately, and say that one bone is in the wrong place, and you think that one bone is completely independent from the other. The important thing is to realize that the bones are inside the same continuous sheath, and no matter how badly they are distorted, they don't

move outside of the sheath. They are still inside the same joint capsule, and that is what gives us the opportunity to actually rebuild it.

There are two important things to understand:

- a) the limitations of the bio-mechanical mobility, (when we move his leg, it is blocked against his pelvis), there is zero mobility there.
- b) the lack of volume. You can see that the muscle tone is very, very bad.

What will happen in future? The volume is going to grow – his bum is going to grow in size, he is going to get volume there. His leg, which now has the characteristic shape of CP kid, is like a flat vertical oval. It has no depth on the sides. If you look at his leg in cross-section, it is absolutely flat. A normal well leg is round. What we should see as the key signs of progress, is development of roundness, change of the orientation of the thigh. This will be continuous and steady progress. But, once the leg improves its connection with the pelvis (now the leg is as if it doesn't belong to the pelvis), bio-mechanical mobility is going to improve. However, the leg could then show lots of odd alignments, for instance, facing in odd directions, getting stuck in that position, etc. So you see, reconnecting the leg, the way you can look at it, it is like a wound up spiral which has been unscrewed several times, now we have to screw it back, tighten up the screw again. But in the mean time, the leg is going to go into plenty of odd directions. We want a better connection of the leg in the hip socket, but the primary thing in the beginning is volume.

In a well person, the pelvis is wider than the leg, otherwise how can the leg be in the correct position in the pelvis? Therefore the first thing that has to happen, is that the pelvis has to open up to develop the roof over the leg. In Gegi, his pelvis is folded forwards. Because it is folded forwards, his sacrum protrudes outwards. The sacrum itself has to be in, rather than out. At the same time his pelvis is flipped sideways and up, which is why the tone of the muscles of the pelvic floor is completely non-existent. If you push your finger into his bum to touch the pelvic floor, you can feel that the muscle tone is absent. He has no pelvic floor to hold the pelvis together. The third thing is that the pelvis is tilted upwards. If you look at the top of his pelvis and the bottom of his lower ribs, the highest point of the pelvis is higher than the lowest point of his ribs. In fact, the highest point of the pelvis should be much lower than the lowest point of the ribs. If you grab his hip-bone between your fingers, it feels like a naked bone with no volume around it. This volume has to be filled in. Filling in the volume is the basis of his bio-mechanical recovery.

Gegi's situation at the moment is very very bad. Unfortunately, you can't jump from quadruple very bad to good. Your next plus one is from quadruple very bad to triple very bad. From triple very bad to double very bad. So in the beginning of doing ABR, when you actually see things changing, it is still bad, but it is different. It will be difficult for you to judge if he is changing to quintuple very bad, or if it is just triple very bad!

Segmentation, volume and sequence of development from the head downwards, independence of bio-mechanical mobility - these are the essentials, these are the bottom-line elements of construction. In that sense, the logic and the entire strategy of this approach, is the complete opposite of what you have been doing up to now.

Previously, you were capitalizing on remaining bio-mechanical mobilities, trying to put them to some functional use, building the compensation, because when the poor structure is put to a functional use, it is always to some extent the performance of structures which are not really designed for that specific function. Simply speaking, if you make a child whose shoulder blade is in the wrong position crawl, you should not expect that he is going to use the same muscular groups in the same way as a healthy child. On the one hand, it is a plus that your child has gained some mobility, but on the other hand, this is a dead end, it doesn't lead you anywhere. This approach has a very clear limit, because this is not the way the body has been designed to function - the vectors are all wrong. For me, all the previous functional achievements that are based on compensation, are meaningless. If they remain, or if some part of them remain and some disappear, fine. If some functional achievements disappear temporarily, it doesn't bother me. Seen figuratively, you have put up scaffolding to build a certain mobility "bypass", so once you start rebuilding the structure, it kind of demolishes your scaffolding. Head control based on the posterior tilt of the head is not the kind of functional achievement to hold on to, because it leads you nowhere, and stops further proper structural development.

So, first of all, bio-mechanical mobility of the structure, and then, gradual development of strength within, will bring you up to a much higher level. Today, Gegi's sitting in a W-position, balancing himself, is based on rigidity. So, once we start restoring the mobility, for every point of mobility, you have to build up sufficient strength. That is the point, that to hold a position with rigidity is no effort, you just block it, fuse it, but it doesn't lead you any further. So, when you regain bio-mechanical mobility, you have to rebuild the strength in all directions. The development of volume, independence of structural mobility and sequence of development from the head downwards, are the things that distinguish a healthy individual from a CP child. The reason why a CP child's function and structure deteriorate as he grows bigger, is because these normal developments do not happen in a CP child.