Asia-Pacific Chiropractic Journal

CLINICAL EVIDENCE

Chiropractic care of a 9-week old female with Erb's palsy: A case report.

Karen Forsyth

Abstract: Objective: This is a single case study involving a 9-week old female with a right Erb's palsy injury following birth trauma.

Clinical features: A 9-week old female presented with no movement in her right arm, rather it hung limply by her side.

Chiropractic examination revealed a S1 subluxation.

Intervention and Outcomes: Chiropractic care was administered which was associated with restoration of movement to her right shoulder and elbow with strength and motor skills continually becoming greater with time and further treatment. Passive range of motion exercises along with taping of the brachioradialis muscle were also used in the early stages of care.

Conclusion: This case provides some supporting evidence that chiropractic care can have a positive effect on resolving Erb's palsy from birth trauma.

Indexing Terms: Erb's palsy, subluxation, birth trauma, dural tension, Gonstead chiropractic.

Introduction

Erb's palsy is a brachial plexus injury that can occur during childbirth. It is thought to be as a result of lateral traction forces or from direct compression on the nerve structure. The injury occurs at Erb's point, where C5 and C6 unite to form the upper trunk of the brachial plexus. (Chater et al, 2004) The motor portion of the C5 and C6 nerve roots are affected. (Anrig, 1998) A baby with Erb's palsy holds the affected shoulder in internal rotation, with extension and pronation of the elbow and the wrist in flexion. (Chater et al, 2004).

> *... this case report demonstrates a very low-risk approach to resolving infantile colic using Gonstead Methods.'*

This deformity is described as a '*waiter's tip*' and is synonymous with Erb's palsy. (op.cit) The child hangs the affected arm limply by their side and is unable to abduct or externally rotate at the shoulder, flex and actively supinate and pronate at the elbow. (Andersen et al, 2006) There is a paralysis of the biceps, deltoid, supraspinatus and brachioradialis muscles. (Davies, 2000) There are various degrees of injury to the nerve that can occur ranging from mild to complete avulsion. In a mild case the nerve typically recovers within a few weeks and full movement to the arm is restored while there is a very poor outcome with complete nerve avulsion, (Andersen et al, 2006) There are very few randomised controlled trials that have looked at the non-operative

management of brachial plexus injuries but the evidence to date suggests that the natural history of the injury reveals that there is a 20 to 30% risk of residual deformity remaining (op.cit) A study by Evans-Jones et al (2003) followed infants from birth to 6 months and found that 46% of children had yet to fully recover function in any muscle group associated with the injury.

Long term residual defects can be muscular weakness, shoulder and elbow contractures, bony deformity and shortening of the involved arm (op.cit) Recovery can take 5 to 6 years. Surgery is an option for more severe cases; however, the evidence is not conclusive to suggest it is associated with a successful outcome and often a second surgery is required to treat an internal shoulder contracture and associated weakness of abduction and external rotation. (Andersen et al, 2006)

This case reports on a 9-week old girl that presented with a right Erb's palsy injury who received chiropractic care. Since birth she had no movement in her right arm, and the full extent of the nerve damage was yet to be determined. She had seen a specialist and the plan was to wait and see if there was any spontaneous improvement of the injury; however, this did not seem to be a likely possibility at this stage. Her mother brought her in for chiropractic care with no real expectations but more as a final hope before resorting to surgery and accepting the current state of Isabelle's injury, as she had heard of other's who had some success with chiropractic adjustments.

Case history

Isabelle, Date of birth May, 2017.

Isabelle was brought in for chiropractic care by her mother when she was 9 weeks old. Informed consent for treatment was obtained from the parents of the child. She is the second child; her older sister is 3 years old. Isabelle was diagnosed with Erb's palsy 2 days post birth after her parents noticed she was unable to use her right arm. At the time of her birth neither the mother nor father were informed of any birth injury.

The mother had constant nausea throughout her pregnancy, and it was otherwise uneventful. Labour was induced at 39 weeks. It was a 17-hour labour. The mother required an epidural and forceps were used in the final stage. Isabelle weighed 9lb 3oz, her older sister was 9lb 1oz. The mother ended up having a dural leak and required a blood patch post birth.

A surgeon had been consulted for Isabelle's nerve palsy and he was unable to determine the full extent of nerve damage at this time. It was suspected the nerve had been avulsed. Her next appointment with the surgeon was in 1 month with the thought a nerve transplant would be required. The extent of neural damage is typically assessed by evaluating the recovery over time as the initial presenting clinical features are similar for all severities of erb's palsy injury (Pondaag et al. (2004)

Isabelle's mother had been on a Facebook support group and had read of some reported success in the treatment of Erb's palsy with chiropractic care so she had brought her in to see if chiropractic care would offer any hope to Isabelle. She was hopeful but not overly confident that there would be any improvement in her arm movement but felt she had nothing to lose by trying before the next surgeon's appointment.

Clinical findings

When observing Isabelle her right arm hung loosely by her side, she was unable to abduct or flex the right shoulder and there was no movement in the right elbow. When she was lying supine, her whole body was rotated to the left in a banana bend shape.

On examination the pull to sit test was not strong, she had head lag and decreased muscle tone. There was no Landau present at this stage. When passively moving her right shoulder through

flexion and abduction she exhibited some pain toward the latter end of range of motion and palpation of the humerus revealed tenderness on the humeral head. Muscle stretch reflexes were absent in the right upper limb. The Moro reflex was asymmetrical with the right arm not moving.

A chiropractic examination revealed decreased lateral flexion in the cervical spine bilaterally, decreased shoulder abduction bilaterally, decreased extension at L5 S1, positive Shimizu bilaterally, decreased S1 reflex bilaterally and oedema was present at L5 S1. A nervoscope wasn't used due to the size of the patient instead motion and static palpation and the above neurological findings were relied upon to identify the subluxation present.

Chiropractic diagnosis

A chiropractic diagnosis of sacral S1 segment posterior dyskinesia was established. At a following examination a right AI humerus dyskinesia was found.

I explained my findings with Isabelle's mum and suggested we adjust S1 and see how Isabelle responds. I asked her to allow me 3 or 4 visits to see some response. The visits would be spaced out over the next 1 month to 6 weeks.

Treatment and outcomes

After receiving informed consent an adjustment to S1 was made. The mother was an Occupational Therapist and was doing some passive range of motion exercises with Isabelle's right shoulder and elbow daily and it was recommended she continue with this, numerous times throughout the day.

On return 5 days later Isabelle's mother revealed that 1-day post treatment she had begun to actively abduct her right arm, with 20 degrees abduction present. The mother also taped her right arm at brachioradialis insertion to control pronation and she was performing the passive range of motion exercises daily. When palpating the proximal humerus there was a decrease in tenderness. Once again S1 was adjusted as the subluxation signs were once again present.

Visit 3 was 2 weeks later, allowing Isabelle time to heal and for nerve function to begin to restore. She was continually showing more active range of motion in the shoulder and elbow and now had gravity assisted flexion in her right elbow. S1 was again adjusted on this visit. Her next visit was scheduled for 3 weeks and she was scheduled to see the surgeon before this visit.

Surgery was once again delayed following her examination with the neurosurgeon as he was pleased with her progress. Regular chiropractic visits continued to ensure the nerve function could be restored or help with nerve regeneration. It was yet to be determined the exact extent of the nerve injury.

At 4 months of age she could bring her hands together and she began to roll at 5 months. She had not regained full strength in her right arm; however, her MSR's were able to be elicited. At 6 months she was able to sit for short times unassisted, could roll both ways and had begun to use her left arm to lift her right arm up.

At 8 months there was no controlled supination at her right elbow, but she was using her right arm instinctively to reach for objects. At 14 months Isabelle walked, her MSR's had increased in response to +3. Right shoulder abduction and flexion was at 170 degrees.

At her last visit in April 2019 her grandparents brought her in and commented that the only problem they saw with Isabelle is she found it hard to get a spoon to her mouth as she didn't have full supination in her right elbow. Isabelle continues to be checked every 2 to 3 months as full resolution hasn't been obtained and as motor skills develop it is important to ensure development is symmetrical and occurs in the correct hierarchical manner.

Her mother found that Isabelle would show consistent improvement and then start to stagnate, and she would know it was time to bring her back to the office for an adjustment. She was happy that surgery was being postponed; however, she was still of the belief that it would be required in the future.

In February of 2018 a nerve conduction test showed it was currently at 25%. The specialist was still holding off the surgery until her next appointment in June. In December 2018 the specialist decided that surgery would not be necessary, and her next appointment was scheduled for 6 months' time.

Treatment overview

#	t =	Care	Clinical note
1		S1 posterior; Baby was prone across the mother's knees. Index finger contact, pencil grip as support, on S1 tubercle. Line of correction P-A through the plane	
2	5 days	S1 posterior	20 degrees right arm abduction 1-day post visit
3	2 weeks later	S1 posterior	90 degrees right arm abduction. Gravity assisted flexion right elbow
4	3 weeks later	S1 posterior Right AI humerus. Humerus adjustment; contact on the greater tubercle of the humerus using an index finger. Line of correction A-P	Hands could be brought together in front of her. Active elbow flexion and pronation
5	1 month later	S1 posterior Right AI humerus	C5 C6 MSR +1. Right arm was not yet at full strength
6	6 weeks later	S1 posterior Right AI humerus	Rolling both ways, sitting unassisted for short times. Using her left arm to lift her right, able to play with toys in front of her with both hands. Improvement had just started to stagnate in the last 2 weeks
7	2 months later	S1 posterior Right AI humerus	C5 C6 MSR +2 Using her right arm instinctively. Crawling was beginning. No right elbow supination yet
8	3 months later	S1 posterior, Right AI humerus, Right P-M ulna. Ulna adjustment contact was the medial aspect of the superior ulna using the distal pad of the thumb. Line of correction is medial to lateral.	Nerve conduction tests performed and scored at 25%. Holding her forearm in pronation still and had started bum scooting
9	1 month later	S1 posterior, Right AI humerus	Crawling on all 4's now. When she gets tired her right arm can hang a bit
10	2 months later	S1 posterior, Right AI humerus	C5 MSR +3. She had just started to decrease the use of her right arm in the last 2 weeks and had begun walking. No surgery required at this point
11	3 months later	S1 posterior, Right AI humerus	Right arm abduction active 160 degrees, able to push a ball with her right arm and uses her right arm preferentially over the left at times. C5 C6 C7 MSR +3. Appointment with the specialist in 2 months.

12	2 months, day before the next specialist appointment	S1 posterior, Right AI humerus	
13	2 months later	S1 posterior, Right AI humerus	Good movement in the right arm. The specialist recommended no surgery required and to return in 6 months for review.
14	2 months later		It was noticed that when using a spoon Isabelle didn't have full, controlled supination in her right elbow as she brought the spoon to her mouth.

Discussion

Erb's palsy is an injury of the brachial plexus that occurs during childbirth. Damage occurs to the nerve roots of the 5th and 6th cervical nerves, typically at Erb's point where the C5 and C6 nerve roots join. (Weisaeker et al, 2007; Davies, 2000; Chater et al, 2004) This results in paralysis of the biceps, deltoid, supraspinatus and brachioradialis muscles with the baby unable to abduct and flex the shoulder and at the elbow an inability to supinate, pronate and flex (Davies, 2000; Anderson et al, 2006). The arm lays limp at the baby's side held in adduction and internal rotation at the shoulder, extension of the elbow, pronation of the forearm and with the wrist held in flexion. This is often described as a '*waiter's tip*' deformity, (Kay, 1998; Anrig, 1998) The muscles involved with shoulder internal rotation and adduction, elbow extension and wrist flexion are unaffected, (Andersen et al, 2006)

The typical cause of this injury is a result of traction or compression on the nerve plexus during childbirth, (Weizsaecker et al, 2007) Most commonly it is thought to be due to the use of excessive lateral traction on the brachial plexus during the birth process. (Andersen et al, 2006) Compression and traction of the nerve can occur directly or indirectly from instruments, fingers or between bony structures. (Weizsaecker et al, 2007) It can be as a result of the anterior shoulder passing under the maternal pubic symphysis or when the posterior shoulder passes by the maternal sacral promontory. (Andersen et al, 2006) There is an increased risk of incidence amongst large babies, with vertex presentation and shoulder dystocia, after a prolonged 2nd stage labour, from an assisted delivery or breech birth, maternal diabetes and in a mother who has had a previous infant with brachial plexus palsy. (op.cit)

There are various grades of injury which have different outcome expectations. Neuropraxia is the mildest injury that causes a temporary conduction block at the site of injury and typically, function returns within weeks. (Andersen et al, 2006) Axonotmesis describes disruption of the nerve fibres with the myelin sheath intact. Recovery from this injury can occur within months but may not be complete and a residual deformity may remain. Neurotmesis describes total disruption of the nerves and the fibres need to regenerate to function again, recovery is often not complete. The most severe scenario is complete avulsion from the spinal cord and there is no chance of a full recovery. (Anderson et al, 2006; Chater et al; 2004)

The incidence is believed to be somewhere between 0.5 – 4.4 per 1000 live births. (Weizsaecker et al, 2007; Andersen et al, 2006) There are varied recovery rates reported in the literature, ranging from a few% to 96% achieving spontaneous resolution, (Andersen et al, 2006) report that the natural history of the injury is difficult to predict due to insufficient data being

available and the studies with the highest methodological quality report residual deformities remain in 20 to 33% of cases.

The criteria used to determine the need for surgery is also inconclusive with opinions varied between authors. (Nehme et al, 2002) Treatment recommendations are not validated. However, the general medical protocol involves physiotherapy along with the early implementation of passive joint range of motion and in some cases splinting or taping of the involved limb (Price et al, 2000). Numerous authors suggest if there is not some active range of motion beginning by 3 months of age then full recovery is not likely to be achieved. (Nehme et al, 2002; Pondaag et al, 2004; Bennet and Harrold, 1976)

A review of the literature found a limited number of single case studies involving the use of chiropractic care on children with Erb's palsy.

Alcantara et al (2008) presented the case of an 8-year-old girl with Erb's palsy in her right arm. Gonstead chiropractic adjustments were made to vertebral and extra-vertebral subluxations. After 3 months range of motion, strength and tone were equal bilaterally.

Cooper and Alcantara (2019) reported on a 14-day old male suffering from right Erb's palsy. He suffered from pain with passive and active range of motion of the right arm. A chiropractic adjustment was made to C1 and upon return in 4 days full functional range of motion was present in the right arm.

Ferrero et al (2016) reported on a 5-month-old female with right Erb's palsy. She had received previous physiotherapy treatment that provided no resolution. Chiropractic care began and after a number, of visits, active range of motion was returned to the right arm.

Gordon (2011) presented a single case study involving a 2-week-old male with facial asymmetry and a right arm waiter's tip deformity; however, passive and active range of motion were bilateral and symmetrical. This paper has been referred to in the above case studies as some support for chiropractic care being successful in resolving Erb's palsy. However, it does not represent a typical Erb's palsy and therefore this case does not merit discussion in this paper.

In the case described in this study Isabelle was 9 weeks old and had complete paralysis of her right arm. After 1 adjustment and within 24 hours she was able to actively abduct her right arm to 20 degrees. Isabelle's birth was associated with a number, of predisposing risk factors for an Erb's palsy injury. She was a large baby, weighing 4.167kg, it was an assisted birth with forceps, with a prolonged second stage of labour. The mechanism of injury was most likely due to the traction on the cervical spine and brachial plexus from the forceps used in the birth process.

Of interest is in all these studies there was not one specific site of vertebral subluxation associated with this injury. In this case study the subluxation was found to be S1 and this was subsequently adjusted on the first visit. The proposed mechanism to describe how a subluxation as low as the sacrum can affect the 5th and 6th cervical nerve roots is, an S1 biomechanical misalignment may create a longitudinal tension in the dura and result in dural tension.

The dura mater surrounds the brain and spinal cord and has some firm attachments in the skull, occiput and C1, fuses with the *filum terminale* and attaches at S2. (Nolte,2009; Cramer and Darby, 2014) The spinal dura ensheathes the ventral and dorsal spinal nerve roots, therefore having direct connections with the spinal nerves. (www.craniosacralschool.com) Any biomechanical dysfunction at any of these levels can increase the tension on the dura mater and affect neural integrity. (Hollemann and Knapp, 2011) When there is inflammation in the intervertebral disc the dura mater is tractioned along with related nerve roots (Cramer and Darby, 2014). This traction occurs via the meningovertebral ligaments that have attachments from the dura to the bones of the entire vertebral column. (op.cit)

The birth process along with inutero constraint can result in altered biomechanics of spinal motion segments. (Holleman and Knapp, 2011) The forceps used in the birth process in this case create a lot of pull on the infant's skull. (Tow and Vallone, 2009) The dural connections onto the skull, cervical spine attachments and sacral connections may create tension in the dura and affect the exiting nerves. (op.cit)

This case appears to support the chiropractic premise that the nervous system can be affected by biomechanical dysfunction and restoration of this subluxation restores neural integrity and allows the body to function at its optimum. The idea that chiropractic is only for lower back pain, shoulder pain or only pain and musculoskeletal complaints for that matter appears short sighted and minimalistic.

The vertebral subluxation model according to Lantz (1989) not only involves kinesiopathophysiology but also neuropathology, biomechanical abnormalities, myopathology and histopathlogy. The effects of nerve disruption are not limited to the specific vertebral unit but can be far reaching. Somatic dysfunctions are thought to stimulate associated joint nociceptors and reduce their polarisation threshold. (Van Buskirk, 1990) The action potential generated not only travels to the ascending tracts of the spinal cord but also is thought to travel peripherally to the other branches of that neuron. (op.cit)

An inflammatory response takes place at the site of damage and surrounding areas. The nociceptor axons from both somatic and visceral nerves reach their cell bodies in the dorsal root ganglion or cranial nerve ganglia and then synapse in the spinal cord or brain stem on common interneurons. There is convergence here of these separate axons and they travel together in the ascending pathways to the higher cortical centres. (op.cit) These synapses may be at the associated spinal segment level or up to 5 segments higher or lower. The motor output response then travels to all the various nociceptive sources. This is believed to explain the somatovisceral, somatosomatic, viscerosomatic and visceroviscero reflexes. (op.cit) Nocifensive reflexes are connective tissue changes that occur as a result of the abnormal position of the joint which further activates the nociceptors. (op.cit)

The increase in nociceptive activity associated with a joint subluxation is thought to accompany a reduction in mechanoreceptor activity in the joint complex which leads to an alteration in afferent input, termed dysafferentation. (Seaman and Winterstein, 1998) Mechanoreceptive input affects motor function and it is thought that when input is reduced motor control is compromised. (op.cit) Mechanoreceptors from the lumbar, thoracic and cervical areas relay to a shared higher cortical area and hence widespread connections can be made. (op.cit)

In this case one could wrongly assume, because the C5 and C6 nerve roots were affected that the subluxation was located at C6 or C7. However, this is not how the Gonstead system of chiropractic works. One must find the primary subluxation by assessing motor dysfunction through motion palpation, the use of static palpation to identify areas of oedema, muscle hypertonicity if present and tenderness, note any postural changes and check and measure neurological changes (Gonstead workbook). Just as sciatic pain can be relieved from an atlas adjustment in this case motor function was restored to the C5 and C6 motor nerves from a subluxation at S1. The nerve injury to Isabelle was the more severe axonotmesis or neurotmesis and it was important to see some movement begin before 3 months of age to achieve a better recovery (Kay, 1998; Hughes et al, 1999). If no movement was obtained by 3 months it was likely that nerve root disruption has occurred. (op.cit)

Chiropractic is a wholistic, vitalistic form of health care and a single adjustment, sometimes in seemingly remote areas, can have far reaching and intense effects. This case provides interesting contrast to those in the Chiropractic profession who are '*subluxation deniers*', such as Guillame

Gonclaves, Christine Le Scanff and Charlotte Leboeuf-Yde, Chiropractic Researchers. These three authored and published a paper in *Chiropractic and Manual Therapies*, '*Effect of chiropractic treatment on primary or early secondary prevention: a systematic review with a pedologic approach*', which suggests that vertebral subluxations do not interfere with the functioning of the nervous system. (Gonclaves et al, 2018; www.chiropractic.prosepoint.net) They argue that vitalistic concepts such as '*the body can heal itself and the nervous system controls and co-ordinates all body functions*' are false and chiropractic should be only for musculoskeletal problems. (op.cit) In the case presented in this paper Isabelle did not present with a disease process nor a musculoskeletal complaint but did have neurological dysfunction and a biomechanical disturbance was identified. By correcting the subluxation at S1 the C5 and C6 motor fibres were able to transmit to the muscles they supplied to allow them to function. This case adds support to the idea that correcting a subluxation restores nervous system integrity and allows it to function optimally. If we listened to people like Gonclaves, Le Scanff and Leboeuf-Yde, Isabelle may have been denied chiropractic care which would have been devastating for her and her family.

There were numerous risk factors present in Isabelle's birth that may have increased the chance of her suffering from an Erb's palsy injury while also increasing her chances of becoming subluxated; she was a large baby, had a long labour and needed forceps to assist her in her final stages of birth. A difficult labour due to a difficult passage through the maternal birth canal along with mechanical extraction can result in joint fixation problems, or a subluxation. (Vallone et al, 2009)

In this case the subluxation was located at S1 and subsequently adjusted on the first visit. This allowed a return to normal neural integrity and allowed the motor fibres of C5 and C6 nerves to begin to fire. The timing of her chiropractic visits was based upon the Gonstead premise of giving the body time to heal and don't over-adjust. (Gonstead workbook) The decision to see her again in 5 days was made to allow for this healing but also bearing in mind that at present she had quite asymmetrical motor function that impacts input to the higher cortical centres. Brain plasticity can result in alteration to the motor area relating to the right arm, so it was important that her neurology was checked regularly.

For treatment of Erb's palsy to be successful there are certain time periods for which you should see improvement, therefore it is recommended these children are checked on a monthly basis. (Price et al, 2000) The decision to have surgery is best made early rather than late so it was also important to ensure improvements continued to allow her the best chance of not requiring this. A recent systematic review by McNeely and Drake found there was no conclusive evidence that surgery was beneficial and often a secondary surgery was required after the first. (Andersen et al, 2006)

The clinical presentation of all Erb's palsy injuries is the same at birth and time is used to help diagnose the true extent of injury received. (Pondaag et al, 2004) Time was increased between visits and it became apparent to mum when she needed an adjustment because her improvement would stagnate or decline. Visits were also scheduled to coincide with her developmental milestones and prior to her upcoming specialist appointments. The hierarchal manner of which primitive reflexes are integrated, postural reflexes begin, and motor development occurs is very important to long term behaviour and learning outcomes (www.ilslearningcorner.com). Chiropractic care for Isabelle also focused on this.

The expected recovery from Erb's palsy varies. For a milder injury of neuropraxia recovery within 1 month is common; however, for the more severe injury recovery times vary, treatment recommendations depend upon the amount of movement at 2 to 3 months of age and the number that obtain a full recovery varies with Wickstrom suggesting up to 88% can have a permanent

residual deformity. (Hughes et al, 1999) For those that were able to achieve a full recovery this was apparent by 5 months of age and these children had shown some movement within the first 2 weeks. (Kay,1998)

Not only was her spine checked for subluxations her upper extremity was also regularly assessed. Due to the lack of movement in her right shoulder and elbow and the uneven muscle pull it was important to evaluate the biomechanical placement of her humeral head, proximal ulnar and radius. The ossification of the humeral head and glenoid begins to take permanent shape at about 3 years of age so this is continued to be assessed at each chiropractic visit Isabelle attends. (Price et al, 2000) Neurological recovery can take 5 to 6 years as the plexus reconstructs. (op.cit) Adjustments to the right extremity have been made to an AI humerus and P-M ulna at various visits.

Isabelle today is doing really well, as can be evidenced from observing the way she is feeding herself with her right hand. Limitations to this study include a possibility that this may have been the natural history of the Erb's palsy. However, it would be very coincidental and rather ironic that movement would spontaneously begin the day following chiropractic treatment. Isabelle's mum was near certain that she would require surgery at some point and when I was first consulted there was a high suspicion that the nerve was ruptured, and recovery would be minimal. Other biases and limitations include the lack of a control in this study, it is a small sample with only 1 case being presented and some may even argue the patient may have expected clinical resolution. This latter point is irrelevant as Isabelle was a baby when she received treatment and mum really had little expectations but more hope.

There were no adverse effects associated with the chiropractic care provided to Isabelle and informed consent was obtained by her mum for treatment and inclusion in this study.

Conclusion

This case reports the restoration of movement in the right shoulder and elbow in a child with a right limb Erb's palsy birth injury. First movements in her right arm occurred 1-day post treatment. Over time further active range of motion was obtained in her right shoulder and elbow and she has achieved full developmental milestones at expected age. Isabelle chooses to use her right arm instinctively now, it is still too early to determine her dexterity; however, there is no favouring of her left arm over her right.

The case demonstrates that chiropractic care can have dramatic effects on nerve function. Gonstead chiropractic relies on finding the primary subluxation and adjusting it with the correct line of drive and right amount of force adapted and modified to the anatomy of the patient to restore biomechanical integrity and remove nerve dysfunction. An extensive chiropractic examination, based on the Gonstead chiropractic system, was used on each visit to determine not only the correct segment to adjust but also if it required adjusting. Visits were scheduled according to developmental milestones, time constraints associated with the Erb's palsy injury and mum's observations.

A key point to note is that Chiropractic should be considered a wholistic healthcare modality that restores neurological function. Whether you call this vitalistic would depend upon the definition. However, this case has potentially shown that chiropractic has a far more extensive type of treatment than only for musculoskeletal complaints. By allowing the nervous system to develop improved or unimpeded function, the body is then able to better function optimally. One wonders how the subluxation deniers would scientifically explain the results of this and other similar case studies.

In this case Chiropractic care has been shown to be successful in correcting the Erb's palsy nerve injury and restoring function to the right arm. There are limitations to suggesting all Erb's palsy injuries can be resolved with chiropractic care, however, clearly further studies are warranted and should be supported.

Karen Forsyth
B.App.Sc (Clin) B.Chiro.Sc M.Chiro.Sc (Paediatrics) GCS Diplomate
Private practice, Warrnambool
karen@banyanchiropractic.com.au

Informed consent to chiropractic care, signed by the patient's parent, is held by the practitioner.
Signed parental consent to the publication of this case is held by the *Journal*.

Cite: Forsyth K. Chiropractic care of a 9-week old female with Erb's palsy [Case Report]. Asia-Pac Chiropr J. 2021;1.3:Online only. URL www.apcj.net/forsyth-erbs-palsy/

References

Alcantara, J. Alcantara, J. and Alcantara, J. (2008). Chiropractic Care of A Patient with Erb's Palsy With a Review of the Literature. Journal of Clinical Chiropractic. 11(2): 897-82.

Andersen, J. Watt, J. Olson, J and Van Aerde, J. (2006). Perinatal brachial plexus palsy. Pediatr Child Health. 11(2).

Anrig, C and Plaugher, G. (1998) Pediatric Chiropractic. Williams and Wilkins.

Bennet, G and Harrold, A. (1976). Prognosis and early Management of birth injuries to the brachial plexus. BMJ.

Chater, M. Camfield, P. and Camfield, C. (2004). Erb's palsy – Who is to blame and what will happen? Pediatr Child Health. 9(8).

Cooper, K and Alcantara, J. (2019). Resolution of Brachial Plexus Palsy from Birth Trauma Following Chiropractic Care to Reduce Vertebral Subluxation: A Case Report and Review of the Literature. J Pediatric, Maternal & Family Health.

Cramer, G and Darby, S. (2014). Clinical Anatomy of the Spine, Spinal Cord and ANS. Elsevier. 3rd Ed.

Davies, N. (2000). Chiropractic Paediatrics. A Clinical Handbook. Churchill Livingstone.

Evans-Jones, g. Kay, S. Weindling, A. Cranny, G. Ward, A. Bradshaw, A. and Herron, C. (2003). Congenital brachial palsy incidence causes and outcome in the United Kingdom and Republic of Ireland. Arch Dis Child Fetal Neonatal. 88.

Ferrero, F. Gregor Smith, M. Alcantara, J and Russell, D. (2016). Resolution of Erb-Duchenne Palsy in a 5-month-old Female Following Subluxation Based Chiropractic Care. Journal of Pediatric, Maternal and Family Health.

Gonclaves, G. Le Scanff, C. and Leboeuf-Yde, C. (2018). Effect of chiropractic treatment on primary and early secondary prevention: A systematic review with a pedagogic approach. Chiropractic & Manual Therapies. 26:10.

Gonstead Clinical Studies Society Australia. Gonstead Seminar of Chiropractic General Class Notes and Workbook.

Gordon, S. (2011). Chiropractic Management of a Combined Neonatal Brachial Plexus and Facial Nerve Palsy: A Case Report. P 879-82.

Holleman, A and Knaap, S. (2011). Chiropractic management of breastfeeding difficulties: a case report. Journal of Chiropractic Medicine. 10.

Hughes, A. Harley, E. Milmoe, G. Bala, R. and Martorella, A. (1999). Birth Trauma in the Head and Neck. Arch Otolaryngeal, Head, Neck Surgery. 125.

Kay, S. (1998). Obstetrical brachial palsy. British J of Plastic Surgery. 51.p43-50.

Lantz, C. (1989). The Vertebral Subluxation Complex PART 1. An Introduction to the Model and Kinesiological Component. Chiropractic Research Journal. 1(3): 23-36.

Nehme, A. Kany, J Sales-De-Gauzy, J. Charlet, J. Dautel, G and Cahuzac, J (2002). Obstetrical Brachial Plexus Palsy. Prediction of Outcome in Upper Root Injuries. Journal of Hand Surgery. 27:9.

Nolte, J. (2009). The Human Brain An Introduction to Its Functional Anatomy. Mosby Elsevier. 6th Ed.

No proof that Subluxations Exist States Chiropractic Researcher Leboeuf-Yde. (April 2018) The Chronicle of Chiropractic. URL www.chiropractic.prosepoint.net Accessed June 18th 2018.

Pondaag, W. Malessy, M van Dijk, J. and Thomeer, R. (2004). Natural History of obstetrical brachial plexus palsy: a systematic review. Developmental Medicine & Child Neurology. 46.

Price, A. Tidwell, M and Grossmanm, J. (2000). Improving Shoulder and Elbow Function in Children with Erb's Palsy. Seminars in Pediatric Neurology 7(1): p 44-51.

Primitive Reflexes: The reason my child has Sensory Issues, Poor Balance and Developmental Delays. URL www.ilslearningcorner.com Accessed 19/6/2009.

Seaman, D and Winterstein, J. (1998). Dysafferentation: A Novel Term to Describe the Neuropathophysiological Effects of Joint Complex Dysfunction. A Look at Likely Mechanisms of Symptom Generation. J Manipulative Physiol Ther. 21(4): 267-80.

Tow, J. and Vallone, S. (2009) Development of an Integrative Relationship in the Care of the Breastfeeding Newborn: Lactation Consultant and Chiropractor. Journal of Clinical Chiropractic Pediatrics. 10(1).

Vallone, S. (2009). First Do No Harm – Chiropractic Care and the Newborn. Journal of Clinical Chiropractic Pediatrics. 10(2): 647-54.

Van Buskirk, R. (1990). Nociceptive reflexes and the somatic dysfunction: A model. JAOA. 90(9).

Weizsaecker, K. Deaver, J. and Cohen, W. (2007). Labour characteristics and neonatal Erb's palsy. International Journal of Obstetrics and Gynaecology.

URL www.craniosacralschool.com. The Cranial Meninges. Accessed July 31st 2019.