
An Exploration of the Impact of Lumbar Spondylolisthesis on Labour: Possible Osteopathic Contributions

MARYSE PARKINSON TASSÉ ■ OSTEOPATHE, D.O., Bsc. OST (Hons) ■ osteowakefield@gmail.com

Recipient of the *Andrew Taylor Still Award* for best qualitative research defended at the Collège d'études ostéopathiques de Montréal, in presence of the International Jury assembled in Montreal April, 2014

SUMMARY

Title: An exploration of the impact of lumbar spondylolisthesis (sp.list.) on labour: possible osteopathic contributions

Subject: Every year, roughly 381,600 women give birth in Canada. Fifteen thousand, or between 4% and 6% of these women, will do so with a lumbar spondylolisthesis (sp.list.), a forward slip of the fifth lumbar vertebrae on the sacral plateau. Discovered in the 18th century in a case in which an obstruction of the birth canal was present during labour, sp.list. can adversely affect childbirth.¹ However, current obstetrical practices do not appear to be taking this condition into account.

Objective: The objective of this study is to increase understanding of the mechanisms by which a sp.list. may affect labour; to study how health professionals who accompany women during labour respond to this condition; and to identify possible axes of osteopathic intervention.²

Hypothesis: We believe that because a sp.list. can negatively affect labour, and the current response to this condition is negligible that there is much room for improvement.

Methodology: An exhaustive review of obstetrical, orthopaedic and osteopathic literature was completed. Research papers dealing directly with labour and sp.list. were studied. Then, the causal and adaptive bio-mechanical processes of SPLs and key affected structures were identified in order to determine how these could affect the process of childbirth. Intersections between knowledge of the mechanics and physiology of childbirth and those of sp.list. have been put forward to build on the understanding of the various intervention mechanisms of a sp.list. on labour provided by scientific articles. This analysis was completed from an osteopathic perspective. Case management currently offered to pregnant women with a sp.list. when they go into labour is explored in a phenomenological section made up of a questionnaire filled out by health practitioners who provide perpartum care (doctors, obstetricians, obstetric nurses, midwives, acupuncturists and osteopaths).

RESULTS

Spondylolisthesis: range of postures presented

Recent scientific advances in orthopaedic research have provided a new understanding of the injury mechanisms associated with sp.list., as well as the biomechanics of postural adaptations in sp.list. cases. There are several mechanisms leading to this condition depending on the different zones of susceptibility associated with various

postural predispositions. Researchers also submit that when a sp.list. results in an anterior translation of the spine, the body produces postural reactions in an effort to shift the centre of gravity backward.³ The body effects this compensation in progressive steps: first, with an augmentation of lumbar lordosis; then, by incorporating the lower dorsals in this lordosis; then, by adding

1 Chatanyar et al., 1964; El-Mowafi, 2008; Elliott et al., 2010; Horduna et Legaye, 2008; Lansac, 1969; Link, 1970; Pedram et Vital, 2005; Rosa, 1961; Skjaerasen, 1964; Vara et Waris, 1952; De Gasquet, 2004; Lalauze Pol, 2008.

2 Lecart (2009).

3 Labelle et al. 2011

a backward tilt to the pelvis, and, eventually, by using knee flexion. The posterior myofascial chain becomes tense, initially through a tightening of the paraspinal muscles and the erector spinae muscles, and then of the hamstring muscles. According to Magora (1976), as the abdominal muscles tend to be inhibited with sp.list., the psoas muscles generally become contracted in an effort to stabilize the spine.

This suggests that treatments for sp.list. should vary according to postural type and severity of adaptation.⁴ It should be noted that the degree to which the quality of life of subjects can be altered varies greatly depending on the level of progression of the sp.list.⁵, rendering preventative treatment very important. Furthermore, pregnancies lead to increased risk of developing a sp.list. later in life.⁶ Herein lie the value of post-natal treatments: the prevention of the development of a sp.list., or through general preventative treatments the reduction of the deterioration of the condition.⁷ With regard to childbirth, it is important to remember that the potential impacts of a sp.list. would vary depending on postural type, compensations and how far the condition has progressed.

Spondylolisthesis and childbirth

The scientific literature dealing directly with cases where sp.list. is present during labour confirms that sp.list. can affect childbirth. The literature identifies more cases of dystocia, mal-positioning of the foetus, longer labour, lower back pain, interventions, epidurals and cesarian sections.⁸ The constriction of the birth canal by bone structures is the main impact mechanism offered by this literature.⁹ The protrusion of the fifth lumbar vertebrae and the anteriorisation of the sacral plateau can narrow the true conjugate of the birth canal's inlet. Inversely, when a sp.list. causes a compensatory retroversion in the pelvis with a sacral counter-nutation, the forward displacement of the sacral apex can narrow the outlet. Thus, osteopaths and other health service providers must anticipate and evaluate the position of the sacrum to determine which strait or birth canal is at greatest risk of being restricted.

The analytic process of this study suggests additional explanations that provide a deeper understanding of the

impacts of sp.list. on childbirth and initiates a methodology of improved care to this affected population. A detailed examination of bone structures, soft tissue, and the vascular, hormonal and nervous systems, as well as pain and the limitations of maternal labour positions has been conducted with care. Numerous significant explanations for impact mechanisms of sp.list. on labour were produced by the analytic process, demonstrating the relevance of the research model used.

DISCUSSION

Until the 1960's, scientific articles on the impacts of sp.list. on labour were published, though the knowledge they have provided has yet to be systematically incorporated in obstetrical literature or practices. The phenomenological section in this study confirms, as the literature suggests, that the adaptation of case management for women with a sp.list. during childbirth is lacking. The literature suggests that in the field of obstetrics, in cases of complications, obstetricians currently favour cesarians over obstetrical interventions that could facilitate natural childbirth.¹⁰ A more effective approach to assisting labour in presence of a sp.list. consists of a Rational approach, as documented by Rosa (1961), in which a pelvimetry is conducted and the exact passage and necessary positioning of the foetus are calculated and guided through obstetric manual assistance and maternal positioning.

The importance of diagnosing spondylolisthesis sp.list. during pregnancy

Given the numerous impacts of a sp.list. on obstetrical prognostics as revealed in this paper, it is imperative that doctors, midwives and osteopaths systematically screen for sp.list. during prenatal care. Ideally, this would lead to care that would be better adapted to facilitating childbirth, as documented by Rosa (1961). More realistically, in the current medical context where there are no specific interventions in cases of sp.list., testing for sp.list. could inform obstetricians of the possibility of dystocia due to birth canal restrictions. This could accelerate a decision to opt for cesarian section in the presence of dystocia,

4 Labelle et al. 2005

5 Labelle et al., 2011

6 Fraser et Sanderson, 1996

7 Hasankhani, 2009; Magora, 1976; Mooney et al., 2000

8 Chatanyar et al., 1964; El-Mowafi, 2008; Elliott et al., 2010; Horduna et Legaye, 2008; Lansac, 1969; Link, 1970; Pedram et Vital, 2005; Rosa, 1961; Skjaerasen, 1964; Unnerus, 1964; Vara et Waris, 1952.

9 Elliott et al., 2010; El-Mowafi, 2008; Hourihane, 1968; Unnerus, 1964.

10 Lecart, 2010

thus reducing the exposure of the foetus to harmful impacts caused by an unnecessarily prolonged labour.¹¹

Another important reason to identify the presence of a sp.list before labour, is that with this condition, the physical landmarks for determining the location for a L4-L5 spinal puncture are altered. Misdirecting an epidural in the presence of a sp.list. can increase the odds of a spinal puncture being carried out more cranially than expected, exposing the subject to increased neurological risks or to damage of the dura mater and undesired spinal taps with loss of cerebrospinal fluid and the headaches that ensue.¹² The authors of this finding recommend the use of spinal imaging during the procedure for this population.¹³ This is a particularly pertinent recommendation for pregnant women with a sp.list as they are given epidurals with greater than typical frequency, all the while being at a higher risk from the procedure.

Osteopathy and spondylolisthesis

The typical osteopathic approach which seeks to restore mobility, may not be appropriate for sp.list. cases where increasing lumbar-sacral mobility specifically could be harmful. In the presence of a sp.list., the body must attempt to stabilize fractured parts in order to limit forward displacement of the vertebral segment, but also to protect the nerve structures.¹⁴ On another note, the osteopaths placed great importance on the mobility but not the shape of the pelvis in the obstetrical context, although the literature has clearly demonstrated the importance of the shape of the pelvis to the obstetrical prognosis¹⁵, particularly with a sp.list. These observations confirm the need for an osteopathic curriculum that allows for the evolution of care, and that welcomes new knowledge in the pursuit of better understanding specific pathologies and conditions.

Theoretical implications for all professions

This research was able to establish that many of the

structural and postural changes noted in the literature as being present with sp.list., have the potential to impact childbirth. In terms of the theoretical implications, these are significant findings that should be taught to practitioners who treat or assist women in the obstetrical context so that they may begin to explore how to better adapt the care given to this population.

Practical implications

This study suggests the need for care to be more proactive and adapted to the particularities associated with the presence of a sp.list, not only during labour, but also in pre and postpartum care. Screening for sp.list should be routine as it presents in about 5% of the birthing population. The obstetric approach of conducting routine pelvic measurements in order to determine which part of the birth canal may present constrictions is considered to be better adapted than trial labour for this population.¹⁶

During prenatal follow-ups, there are some specific issues to address. With sp.list., the paravertebral muscles often exhibit contractures as they attempt to splint the fractured pieces and limit the forward displacement of the vertebrae. We submit that these muscles should be loosened (while maintaining a certain tone around the fractured zone) as their contracture limits counter-nutation, which plays a crucial role in the opening of the pelvic inlet and in allowing foetal engagement to take place.¹⁷ It is equally important to loosen the hamstring muscles¹⁸ in preparation for childbirth to maximise the mobility of the iliac and the coxofemoral articulation. It has been shown that better results are obtained by treating the posterior myofascial chain as a whole, rather than loosening muscles in one area.¹⁹ Sp.list. almost always produce contractures of the psoas muscles, another key structure for childbirth.²⁰ First, psoas are important to labour as they act as a track that guides the descent of the foetus. Also, if contracted, they can reduce the size of the inlet's true conjugate²¹. Further-

11 Lalauze-Pol, 2008

12 Horduna and Legaye, 2008

13 Horduna and Legaye, 2008

14 Miles et Gaines Jr., 2001

15 Blackburn, 2013; Kilpatrick and Garrison, 2012

16 Rosa, P. (1961).

17 Calais-Germain et Parés, 2009

18 Hamstring muscles are known to be contracted with sp.list. (Magora, 1978)

19 Ibraheem, 2005

20 Ibraheem, 2005

21 Molinari reported by Couillard, 2008

more, these contractures can cause increased pain for parturient women with sp.list., as they pull the spine forwards²², which increases shearing in the intervertebral disk and stretching of the posterior lumbar-sacral ligaments. An attempt should be made to loosen the psoas through treatment and exercise, but abdominal support should also be provided with a pregnancy support belt, since contractures in the psoas may be the body's attempt at stabilizing the spine in the absence or loss of muscle tone in the abdominal belt. Finally, it is particularly important that pregnant women with sp.list. especially, (a population presenting elevated rates of foetal malpositioning) be taught the postures that best support optimal foetal positions during the last two months of gestation²³, ie., positions in which mother is leaning forward allowing the foetus to lay in the abdominal wall like a hammock, which encourages an antero occipital position. They should avoid sitting in lazy-boy like positions where the foetus will lay its back to the back of the mother, encouraging a posterior-occipital position.

During the per-partum phase

Based on what has been learned from the literature on labour with sp.list. as well as the data produced through the analysis done for this study, we suggest that during childbirth, particular axes of intervention may improve the obstetrical prognosis for this population, and should be tried in clinical practice. Given the elevated rates of dystocia in labour with sp.list., interventions that aim to facilitate the descent of the foetus should be considered. Firstly, maternal positions that encourage optimal positioning of the foetus near the end of pregnancy must be insisted upon. At the beginning of labour, certain positions increase the chances of optimal, healthy engagement; others can even help reorient the foetus once engaged. Next, in order to open the straits in the birth canal, leverage must be drawn from the mother's arms and legs. This leverage can be achieved through the use of different maternal positions, and external supports can be provided for bedridden parturient women.²⁴ This method can be particularly appropriate for women who give birth with a sp.list., not only because they often pres-

ent with restrictions of the birth canal, but also because they are more often bedridden due to extreme pain and higher epidural rates. The lateral decubitus position is greatly preferable to the dorsal decubitus position. One of the main reasons for this is that this position decompresses the abdominal aorta and the vena cava in front of the lumbosacral junction, allowing the re-establishment of improved uterine blood profusion.²⁵ This option should be considered in cases of sp.list. in which this junction has slid forward and could therefore be a greater threat to the integrity of these vascular structures.

Finally, according to the experiences of many women²⁶, the presence of a sp.list. can lead to increased and intense pain during labour. As such, patients should have access to a wide range of pain management tools during childbirth, since this pain has direct negative repercussions on childbirth prognostics.²⁷ Also, pain at the lumbar-sacral junction (which can occur during labour with sp.list.), could limit the choice of maternal positions, which in turn can have a big impact on the progress of labour. We thus suggest that the various maternal positions often proposed by midwives should be adapted to reduce lumbar extension and the forward slide of the sp.list., as well as diminish the pressure of the foetus on the psoas, the lumbar region or the sacral plateau. This could be achieved by avoiding the prone position and also by reorienting the plane of the inlet by tilting the pelvis backwards and lifting the abdomen.²⁸ This reorients the presentation of the foetus towards the inlet rather than the back. Tension in the psoas can be reduced with a moderate flexing of the hips. Finally, an attempt must be made to diminish lordosis (either through positioning or active support under the abdomen), and diminish the anterior traction of the spine in vertical positions by supporting the abdomen and suspending the mother (e.g. with supports under the armpits).

Regarding post-partum follow-up, we discovered that, following pregnancy, all women should be advised to re-establish abdominal muscle tone, as the literature shows that pregnancy is a risk factor for

22 Jacquin, 2004, Michele 1962 in Hammer, 1992; Troup, 1976

23 Calais-Germain et Parés, 2009

24 De Gasquet, Mélançon, 2009; Molinari reported by Mélançon, 2009

25 Blackburn, 2013

26 Internet Blogs (see Bibliography)

27 Battista et al., 2007

28 McCoy King, 2008

the development of degenerative sp.list.²⁹ This rehabilitation is particularly essential for women who already have a sp.list., since inhibition of the abdominal belt is commonly associated with sp.list.³⁰ Certainly, as with all patients with sp.list., treatment and daily exercises aimed at reducing the progression of the sp.list. are crucial. This involves the relaxation of the posterior myofascial chains (including the paraspinal muscles and hamstrings) and the deep anterior connections (including the psoas), along with life-style considerations such as avoiding lifting of heavy loads, standing for prolonged periods, certain sports, sleeping positions, and high heeled shoes. *Spondysolutions* is a comprehensive guide to exercises for the management of sp.list.

CONCLUSION

Sp.list. can affect childbirth. However, this phenomenon is poorly understood by the healthcare professionals involved during childbirth who were surveyed for this study. The study revealed that osteopathic, anaesthetic and medical interventions can lead to complications if they are not informed by an understanding of the particularities of sp.list.. This study therefore proposes a range of approaches and themes. Osteopaths could and should play an important role in assisting women

and managing care for a sp.list within the obstetrical context. Currently, the main purpose and role of pre-natal osteopathic care is to prepare the mother's structure for labour and as such, must include addressing any issues relating to the integrity of the spino-pelvic structures, such as sp.list. In order to achieve this level of care, osteopaths will require training that provides a framework of practices that are specifically adapted to sp.list. and the various postural changes that stem from it. This research sheds light on several possible lines of intervention that could improve obstetrical prognostics for women with sp.list., and it opens the door to future clinical studies. In the interim, practitioners, be they doctors, mid-wives, osteopaths or acupuncturists could begin to incorporate some of the concepts and guide-lines provided by this study in order to better assist mothers and their babies who must undergo the particularities of labour with a sp.list..

Any practitioner interested in deepening their understanding of the impacts of sp.list on labour in order to better assist this birthing population is invited to consult the full study. For questions or comments the author can be contacted at osteowakefield@gmail.com. Otherwise, the electronic version can be found at www.osteowakefield.com. ■

²⁹ Hammer, 1992

³⁰ Magora, 1978

REFERENCES

as sited in this summary (see Thesis for full bibliography)

- Adkins, J. R. et Bitzer, M.T. (2011). SpondyloSolution. USA: Athlete Movement Systems LLC.
- Battista, L.R. et Wing, D.A. (2007). Abnormal Labor and Induction of Labor. Obstetrics Normal and Problem Pregnancies. (5e ed.). Philadelphie: Churchill Livingstone Elsevier.
- Blackburn, S. (2013). Maternal, Fetal and Neonatal Physiology. A Clinical Perspective, 3e édition., Missouri: Saunders Elsevier.
- Calais-Germain, B. et Vives Parés, N. (2009). Bouger en accouchant. France: Éditions désiris.
- Chatanyar, R., Gonnet, J., Guillaud, H. et Lyonnet, R. (1964) A Case of Pelvis Obstructa Due to Lumbosacral Spondyloma. Traduit de l'italien, Une Observation de pelvis obstructa par spondyliz'emelombo-scar'e. Gynecologie et obstetrique. 63, 555-560.
- Couillard, J. (2008). L'influence des traitements ostéopathiques en cours de grossesse sur le déroulement de l'accouchement. Mémoire présenté devant jury international à Montréal. Collège d'Études Ostéopathiques.
- De Gasquet, B. (2004, mars). La Physiologie du réflexe expulsif. Les Dossiers de l'obstétrique , 325, pp. 25-27.
- Elliott J., Fleming H. et Tucker K. (2012). Asymptomatic Spondylolisthesis and Pregnancy. Journal of Orthopaedic and Sports Physical Therapy. 40 (5): 324.
- El-Mowafi, D.M. (2008). Geneva Foundation for Medical Education and Research, Contracted pelvis. Obstetrics simplified. Consulté mars 2013
www.gfmer.ch/Obstetrics_simplified/contracted_pelvis.htm
- Fraser, R.D. et Sanderson P.L. (1996). The Influence of pregnancy on the development of degenerative spondylolisthesis. Journal Bone Joint Surgery Br., 78(6):951-4.
- Hammer, W. (1992). The Psoas syndrome. Dynamic Chiropractic, 10 (03).
- Hasankhani, E.G. (2009). Efficacy of back care program in chronic back pain during pregnancy. Journal of Chinese Clinical Medicine. 4 (2):87-91.
- Horduna, M., Legaye, J. (2008). Influence of the sagittal anatomy of the pelvis on the intercrestal line position. European Journal of Anaesthesiology. 25(3), 200-205.
- Hourihane, M.J. (1968). Etiology and management of oblique lie. Obstetrics and gynecology. 32 (4):512-519.
- Ibraheem, A. (2005). Effect of Gastrocnemius Muscles in Management of Spondylolisthesis. Bull.Fac.Ph.Th. Cairo University .
- Jacquin, D. (2004, mars). Que reste-t-il de la physiologie. Ostéopathie et grossesse. Les Dossiers de l'obstétrique , 325, pp. 28-31.
- Kilpatrick, S. et Garrison, E. (2012). Normal Labor and Delivery. Dans Gabbe S. G., Niebyl J. R., Simpson J. L., Landon M.B., Galan H.L., Jauniaux E.M. et Driscoll D.A. (Eds). Obstetrics. (6ième éd., pp.267-286). Philadelphie : Saunders Elsevier.
- Labelle, H., Mac-Thiong, J.-M., & Roussouly, P. (2011). Spino-pelvic sagittal balance of spondylolisthesis: a review and classification. Eur Spine, 641-646.
- Labelle, H., Roussouly, P., Berthonnaud, E., Dimnet, J., & O'Brien, M. (2005). The Importance of spino-pelvic balance in L5-S1 developmental spondylolisthesis: A review of pertinent radiologic measurements. Spine, 30 (6), 27-34.
- Lalauze-Pol, R. (2008). Le crâne du nouveau-né. 2e édition. France: Sauramps medical.
- Lansac, J., Nelken S., Gaja R. et Dumont M. (1969). Spondylolisthesis and pregnancy. Traduit du français Spondylolisthesis et grossesse. Revue française de gynécologie et d'obstétrique. 64 (12):689-693.
- Lecart, C. (2009). Radiopelvimétrie et pelvimétrie clinique. Dans Guide de consultation prénatale. Alexandre S., Debiève F., Delvoye P., Kirkpatrick C. et Masson V. (Eds). Paris : Groupe de boeck
- Link G. (1970). Management of Delivery in Spondylolisthesis. Traduit de l'allemand Geburtsleitung bei der Spondylolisthesis. Die Medizinische Welt. 34 (pp 1465-1468).
- Magora A. (1976). Conservative treatment in spondylolisthesis. Clinical Orthopaedics and Related Research. (117):74-79.
- McCoy King, J. (2008). Back Labor No More!! Elmo: Plenary Systems, Inc.
- Mélançon, A. (2009). Recherche qualitative : Synthèse et analyse ostéopathique des positions et mouvements maternels lors de l'accouchement. Mémoire présenté au jury international à Montréal.
- Miles J.D., et. Gains Jr.,R.W. (2001). Spondylolisthesis. Dans Chapman, M. Chapman's Orthopaedic Surgery. USA: Lippincott Williams & Wilkins.
- Mooney, V., Fraser R.D., Love T.W. et Fagan A.B. (2000). Degenerative spondylolisthesis: Developmental or acquired. Journal of Bone and Joint Surgery - Series B. 82 (2):307-308.
- Pedram, M., & Vital, J.-M. (2005). Spondylolisthésis par lyse isthmique. EMC-Rhumatologie Orthopédie, 2, 125-150.
- Rosa, P. (1961). A New example of rational mechanics: spondylolisthesis and childbirth by the natural route. Bulletin de la Societe royale belge de gynécologie et d'obstétrique. 31, 581-584.

REFERENCES cont'd

- Skjaerasen, Egil. (1964). Spondylolisthesis as an obstetrical complication. Traduit de spondylolisthese somobstetrisisk komplikasjon” Nordisk medicin. 71, 652-653.
- Troup, J. (1976). Mechanical Factors in Spondylolisthesis and Spondylolysis. Current Orthopaedic Practice, 117, 59-67.
- Unnerus, C.-E. (1964) Spondylolysis and spondylolisthesis as radiologically established complicating factors in obstetrics. Annales chirurgiae et gynaecologiae Fenniae. 53 (4): 444-453.
- Vara, P. et Waris W. (1952). Low back pain during pregnancy. Annales Chirurgiae et Gynaecologiae Fenniae. 41 (4): 211-222.

Blogs - Consulted in February 2013

- www.mybestbirth.com/forum/topics/pregnancy-birth-spondylolisthesis
- www.babycenter.com/400_spondylolisthesis-during-pregnancy_2285582_969.bc?sortFieldName=
- www.treato.com/C-Section,Spondylolisthesis/?a=s
- www.forum.badbacks.com.au/viewtopic.php?f=4&t=559&start=0

Blogs - Consulted in April 2014

- www.affinitiz.net/space/spondylolisthesis/content/besoin-de-renseignement---spondylo-et-projet-grossesse_B1BDB9CB-1D95-40EC-A463-72DA34E6D035
- www.forum.badbacks.com.au/viewtopic.php?f=4&t=559&start=0
- www.babycenter.com/400_spondylolisthesis-during-pregnancy_2285582_969.bc?sortFieldName=
- www.treato.com/C-Section,Spondylolisthesis/?a=s
- www.forum.aufeminin.com/forum/sante21/___f441_sante21-Enceinte-spondylolisthesis.html
- www.affinitiz.net/space/spondylolisthesis/content/spondylolisthesis-et-osteopathie----_2D85A7BA-07EE-42BE-AC93-77C5FCE3A43E