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CLINICALEVIDENCE

Base Posterior Sacrum Subluxation: A case series of 3

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Abstract: Base posterior sacrum or sacral base posterior, in Gonstead terminology describes a subluxation listing and also the adjustment used to correct it. The subluxation is in the L5/S1 segment, but the adjustment used to make the correction is crucially different to an L5 adjustment for both safety and effectiveness. This is a study of three patients who had base posterior sacrum subluxations adjusted and corrected.

Indexing Terms: Gonstead; Chiropractic; subluxation; adjustment; base posterior sacrum; Oswestry

Introduction

A representative selection of three case studies involving a primary base posterior subluxation were chosen to be presented in this report. Gonstead examination protocols were utilised to analyse the patient, including history, visual inspection, skin temperature differentiation (nervoscope) analysis, static and motion palpation and X-Ray imaging.

> *'... these 3 cases demonstrate the rapid improvement of patient-reported symptoms following Gonstead identification and correction of the Base Posterior Sacrum listing ...'*

To assess changes, pre and post Oswestry lower back disability questionnaire was employed and pre and post X-Ray analysis.

The Oswestry study criteria is an accepted protocol to gauge the perceived disability from the patient's perspective. It is most applicable to cases of persistent, severe disability, suffering from acute or chronic low back pain.

Patient-completed questionnaire gives the researcher a subjective percentage score of level of function (disability) in activities of daily living in those rehabilitating from low back pain. The Oswestry questionnaire involves six statements that are scored from 0 to 5 with the first statement scoring 0 through to the last at 5. For example, in relation to pain:

Section 1 - Pain intensity

- I have no pain at the moment. Score = 0
- The pain is very mild at the moment. Score = 1
- The pain is moderate at the moment. Score = 2
- The pain is fairly severe at the moment. Score = 3
- The pain is very severe at the moment. Score = 4
- The pain is the worst imaginable at the moment. Score = 5

From this patient score, a subjective record can be compiled to quantify patient condition and outcomes. The ODI score (index) is calculated as a percentage. (1)

Case History

Patient A

Patient A was a 46y male working in a heavy manual capacity in air-conditioning water treatment. He had woken two days earlier with severe lower back pain and right anterior thigh pain. There was no particular precipitating incident that he could recall but he felt it was likely related to lifting containers of chemicals up ladders the previous day. This was a usual element of his work routine.

He reported previous episodes of acute pain but not for a few years. He had lost over 40kg of weight over the past couple of years from a weight of 140kg. There was difficulty weight-bearing due to pain and pain on most trunk movements. Non steroidal anti-inflammatory medication (*Voltaren*) provided some relief. Self assessed pain score was up to 9/10. Oswestry lower back disability score was 62%.

The patient reported a previous adverse event following a chiropractic visit 2 years prior. He described a shooting pain to his face and numbness down the arm to his thumb following a manual treatment of the neck. He reported persistence of the thumb numbness. He had not consulted a chiropractor since and still experienced episodic neck pain along with chronic neck and upper back muscle tightness, related to work.

Patient B

Patient B was a 42y male chef. He presented with a 5 day history of acute, mostly central, bilateral lower back pain. The onset of symptoms was attributed to standing and associated lifting in his daily work as a chef.

He had initially hurt his lower back 10 years prior working in a similar fashion experiencing both lower back pain and bilateral neck pain with cooking intermittently since. His presenting symptoms were worse in the morning and aggravated by bending, lifting, standing and sometimes walking.

Symptoms were relieved with sitting and paracetamol. Oswestry lower back disability score was 34% on initial presentation.

Patient C

A 25y male presented with a 4y history of left lower back and hip pain, medial and lateral thigh pain. He was a very large muscular man, previously an elite level rugby league and union player who reported initially hurting himself performing military press with a 60kg barbell. The pain had forced him to give up football 2 years previously along with manual labouring work. He was now a stay at home dad.

His pain had exacerbated in the past 2 months from bending to change nappies and standing at the sink washing up. Typically, his pain was aggravated by bending to pick up and attend to his two young children. There was some symptomatic relief with applying heat. Physiotherapy had provided limited relief.

An MRI scan had apparently demonstrated mild bulging of the L4/5 and L5/S1 discs. He also reported some upper back and neck tension and pain. He would get his 'big' (little) brother, who was over 120kg, to stand on his mid to upper back for relief.

Clinical Findings/Assessments

Patient A

There was notable pain on standing with slight flexion antalgia. There was severe exacerbation of pain on trunk flexion, limited to 20°, and on trunk extension, limited to 5°. Lateral flexion to either side was unremarkable. Pain was exacerbated with a cough. Slump test was negative. Temperature 'breaks' were noted on nervoscope examination at T1/2 and L5/S1. The lumbosacral spine was tender and oedematous on static palpation, with restricted flexion and extension on motion palpation. The T1/2 segment was also noted to be tender and restricted on static palpation.

Patient B

On postural examination the lower back appeared flattened with slight flexion antalgia. Trunk flexion was limited to 20° due to strong pain and extension was minimal, restricted with painful guarding. There was also pain and restriction on left trunk rotation and right *Kemps* test. No exacerbation of pain was noted on coughing and slump test was unremarkable. Skin temperature 'breaks' were noted with the nervoscope at T1, T3 and L5/S1. Restriction was also noted at these levels with associated tenderness on palpation and oedema at S1.

Patient C

Pain was not exacerbated with a cough but apparently had been previously. Left lower back pain was exacerbated with left and right lateral flexion and extension. Slump test was negative. No temperature 'breaks' were noted initially on nervoscope evaluation. The left sacroiliac joint was tender, oedematous and restricted on palpation.

Radiographic Examination

Patient A

Due to antalgia and discomfort weight-bearing, only AP and lateral Lumbar (including pelvis) images were taken on the initial consultation. T12/L1, L3/4 and L4/5 discs showed notable narrowing. T12 and to a lesser extent, L1 vertebral bodies show anterior wedging, suggestive of old compression injury.

In assessing disc uniformity, the inferior endplate of L5 and the superior endplate of S1 are relatively parallel compared to that of the other discs. This gives the L5 disc a somewhat D1 appearance according to Gonstead categorisation. This appearance combined with a flattening of the anterior lumbar curve and decreased sacral base angle is suggestive of a Base Posterior sacrum listing On the AP view the right femoral head is slightly lower than the left (approximately 5mm). The right ilium is listed as AS1Ex6. The appearance of the hips and sacroiliac joints was unremarkable.

Full spine images were taken eight days later, to assess the cervicothoracic spine, particularly considering the previous adverse event and to monitor changes in the lumbar spine. Interestingly the anterior lumbar curve had increased and was considered to have normalised. The L5/S1 disc was relatively more open anteriorly and slightly narrowed posteriorly, compared to the previous image, appearing more uniform in shape to the other lumbar discs.

The anterior cervical curve was reduced with a forward head carriage posture. C4-7 vertebral bodies demonstrated anterior osteophytes and their posterior elements and discs showed degenerative change. There was an increased thoracic kyphosis. C7 and T1 were listed as potential subluxations, C7 PR and T1 PR.

Patient B

Full spinal weight-bearing AP and Lateral X-Ray images were taken. Both the L4/5 and L5/S1 discs appeared to have a relatively parallel appearance given by the superior and inferior end-plate alignment. This is out of keeping with the uniformity of the other lumbar discs. The L5/S1 disc appeared thickened, giving it a D1 appearance. The L3/4 and L4/5 discs appeared marginally thinned. There was very mild anterior osteophyte formation suggested on the upper and lower lumbar vertebral bodies. The AP pelvis image appeared well aligned.

The cervical spine showed marked flattening of the anterior curve and the thoracic posterior curve was modestly flattened. Very mild degenerative changes were suggested generally through the thoracic and cervical spine. A mild right convex curve was evident with the apex at T6. Initial listings of potential subluxations were taken as Base Posterior sacrum, C7 PL, T3 PRI-t andT7PL.

A lateral lumbar weight-bearing image was taken 7 days after the initial image for the purpose of assessing changes in alignment post adjustment. An improved, increased anterior lumbar curve was noted. Whilst the L5/S1 disc shape appeared to differ in uniformity to the other lumbar discs, according to the inferior endplate of L5 and the superior endplate of S1 alignment suggest the L5/S1 disc was less open posteriorly than in the initial image. This effectively suggests a reduction in the Base Posterior sacrum misalignment.

Patient C

AP and lateral lumbar/pelvis radiographs were taken. Despite the upper back symptoms, it was felt that due to the width of the patient's shoulders, lateral thoracic images would be largely ineffective for assessment. Of note, there was anterolisthesis of L5 with the L5/S1 disc appearing more parallel to the uniformity of the other lumbar discs. There was malformation in the midline union of the posterior elements of L5 and *spina bifida occulta* observed at S1.

The left femoral head height was measured at 15mm lower than the right and there was a left convex compensatory curve in the lumbar spine. Despite the relatively parallel L5/S1 disc margins, the remainder of the lumbar spine was considered to be slightly hyperlordotic. The sacrum was listed as P-L2. Right ilium was PI4Ex2. Base posterior sacrum was also listed.

To assess post adjustment changes the AP and lateral lumbar images were retaken after 14 days (3 visits). Despite persistence of the L5 anterolisthesis, the L5/S1 disc appeared more closed posteriorly when compared to the previous image. This is more in keeping with the uniformity of the other lumbar discs and it has lost the base posterior sacrum appearance. The femoral head height inequality has reduced from 15mm to 9mm. Accordingly the angle of convexity to the left in the lumbar has reduced, as has lumbar spine vertebral body rotation.

The left sacroiliac joint previously listed as P-L2, appears left ilium Ex5.

Chiropractic diagnosis

Patient A

A combination of history, range of motion, instrumentation, static palpation, motion palpation and radiographic findings suggested a Base Posterior sacrum subluxation as this patient's primary presenting problem. The positive cough finding was likely related to swelling of the L5/S1 disc, provoking the pain sensitive annulus fibres, despite a negative slump test finding

Patient B

The primary subluxation for this patient was also the Base Posterior sacrum. Certainly, the flattened lumbar spine presentation and poor trunk extension together with the S1 tenderness, oedema, skin temperature findings and lumbosacral motion suggested this. Confirmation was made with the radiographic analysis.

Patient C

Rotated sacrum and base posterior sacrum subluxations contributed to this patient's poor lumbosacral biomechanics and associated pain. The usual Gonstead methodology, described above, was utilised to determine the appropriateness and timing of these adjustments. These factors were believed to make the underlying anterolisthesis symptomatic or at least symptomatically worse. The subluxations mentioned could be expected to cause more stress on the posterior annulus fibres of the L5/S1 disc.

Treatment

Patient A

On the initial visit the BP sacrum was adjusted on the pelvic bench. Following the adjustment, on getting up walking around the room, there was notable improvement overall but there was some sharp pain in the right sacroiliac region. The right SI joint was palpated and found to be tender, restricted and felt oedematous. My impression was that in adjusting the BP sacrum, the right SI joint had been left relatively open posteriorly which was adjusted with a gentle right PIEx ilium pull move. This provided immediate relief.

The patient was scheduled to return the next day. He presented with a feeling of marked improvement in symptoms and was weight-bearing comfortably. He had trunk flexion of 60° and extension of 20°. The BP sacrum was again adjusted but this time a light bridge contact was used to the right PSIS to essentially support the ilium and not leave it relatively posterior to the right side of the sacrum. The patient was scheduled to return in 1week.

He then presented free of lower back pain with full unimpeded trunk range of motion, no nervoscope reading was found in the lumbar region, there was no tenderness or obvious oedema on static palpation, and no lumbosacral restriction on motion palpation. He did report neck pain and a vague headache. Full spine X-Ray images were taken on this occasion, to assess his long standing neck injury and review lumbosacral spinal changes. T1 PR was adjusted in a seated position, and a left posterior proximal ulna adjustment was made (the patient had demonstrated some mild chronic lateral epicondylitis).

He was instructed on bending and lifting technique, given exercises to improve his form in this regard and advised to return for review in 1 week. He discontinued care prior to that scheduled visit, claiming he was asymptomatic and instead referred his mother.

Patient B

On the initial visit a BP sacrum adjustment was performed on the pelvic bench. The patient felt immediate relief. He returned for an appointment 2 days later and reported that the pain had recurred 3 hours after the adjustment. He had taken *Paracetamol* and the pain eased. On examination indications did not exist to warrant a sacral adjustment. T3 PRI-t was adjusted on the Hylo table.

Work related bending and lifting technique was discussed and rehearsed. The patient returned another 5 days later. He was without lower back pain but reported that there was some lower back pain on the previous day. He reported that neck pain had resolved following the adjustment. Indications suggested BP sacrum which was again adjusted on the pelvic bench. Neck extensor exercises were prescribed. The patient presented 1wk later with an absence of back or neck pain. T4 PRS was adjusted on the knee chest table. He was scheduled for review after 1 month. He chose not to return for that visit, reporting that there had been no recurrence of neck or back pain.

Patient C

On the first visit P-L sacrum was adjusted. The left sacroiliac joint palpated as restricted and tender, there was no temperature break noted in the lumbosacral spine or was there considered to be significant fixation at this level. The patient returned two days later and reported the pain persisted, but he felt freer on left lateral flexion. On examination trunk extension was the only painful direction of movement. A nervoscope temperature break was detected at the lumbosacral junction with associated restriction on motion palpation. The left sacroiliac joint was not tender and was not restricted on motion palpation.

BP sacrum was adjusted on this visit. The patient returned 4 days later and reported significant improvement. Extension had improved on examination. BP sacrum was again adjusted in keeping with temperature and palpatory findings. He was anxious to return to exercise and was advised that he could begin with gentle core stability exercises which were prescribed. There was further improvement on examination one week later. There was a ‘scope reading, tenderness and mild

restriction at L5/S1, and tenderness and restriction at the left sacroiliac joint. BP sacrum was adjusted with a left bias contact.

On returning 15 days later the patient reported only mild residual occasional pain. He said he could relieve that instantly by twisting his lower back until it clicked (essentially an auto-manipulation). He was increasing his exercise and weight training without incident but said he still felt weak in the gluteal muscles. The only finding on examination was slight restriction of the right sacroiliac joint. This was gently adjusted but with failure to get an audible release. He was instructed on better activating his gluteal muscles and advised to cease auto-manipulating his lower back. An appointment was scheduled for 3weeks, which he failed to keep. He returned after 6 weeks and reported a milder recurrence of lower back from sitting on the floor for a prolonged time doing a course, the week prior. BP sacrum was again adjusted and the patient advised to return for care on the recurrence of any symptoms.

Results

Patient A

The patient's initial active lumbar range of motion was 20° in flexion and 5° in extension. The following day on the second visit, lumbar flexion was approximately 60° and extension 20°. Full range of motion was achieved one week later. Oswestry lower back disability score was 62% on initial presentation and 0% 8 days later. The self assessed pain score was up to 9 out of 10 on initial presentation and 0 out of 10, eight days later.

Patient B

The patient's initial active lumbar range of motion was 20° in flexion and near 0° extension, both limited by pain. Pain was also elicited on left rotation and right Kemps manoeuvre. On review 2 days later and again after 1 week, there was mild residual pain on full extension only. 13 days after initial presentation there was no reported pain with full unimpeded range of motion. Oswestry lower back disability score was 34% on initial presentation and 6% one week later

Patient C

On initial presentation this patient scored 40% on an Oswestry lower back disability questionnaire. He had an anterolisthesis of L5 with components of sacral rotation and base posterior sacrum contributing to his symptomatic picture. His Oswestry score improved to 12% within one week and to 6% in less than 1month. On radiographic imaging, normalisation of the L5/S1 disc profile and general lumbar pelvic alignment can quite clearly be seen within 2weeks (after 3 visits).

Discussion

A case series of three consecutive patients, in whom the primary subluxation was a base posterior (BP) sacrum listing was selected for this study. The rationale for choosing the BP sacrum was that it is usually well recognised on radiographic analysis with confirmation from physical examination findings, and regardless of the chronicity of the presentation, often responds positively over a short period of time to correct adjustment.

Change in sacral and lumbar alignment may also be identified on post adjustment radiographic imaging. In all adjustments, contact and line of correction are crucial, and this is especially so with the base posterior sacrum subluxation.

We have both within our profession and externally heard that the use of X-ray imaging for biomechanical assessment and treatment protocol guidance is not evidenced based practice. Bussières (2) after conducting a comprehensive review of the literature, supports '*the "linear- no-threshold" model of cancer risk from ionizing radiation exposure*'. He further states '*Given the potential risks associated with conventional radiographs, only appropriate clinical indications can justify its use*'. He suggests the '*need to confirm pathology, to follow the evolution of a pathology possibly affecting therapy, or to identify a clinically suspected contraindication to manipulative therapy is the best-documented reason*' to take x-ray images.

Interestingly a paper published in *The Journal of Nuclear Medicine* (2017 (3)) suggests that, '*Credible evidence of imaging-related low-dose (<100 mGy) carcinogenic risk is non-existent; it is a hypothetical risk derived from the demonstrably false LNTH (LNTH = linear-no-threshold hypothesis, referring to no safe level of radiation exposure)*'. The study further claims '*On the contrary, low-dose radiation does not cause, but more likely helps prevent, cancer*'.

Regardless of safety there exists an argument that there is nothing to be gained for the lower back pain patient, with the exclusion of red flags, in the utilisation of imaging. '*Reviews of evidence universally conclude that radiological imaging for acute non-specific LBP (i.e. serious pathology or radicular syndromes are not suspected) is not appropriate*', citing a model of care downloaded from the NSW State Government. (4) Unfortunately this view takes in the potential benefit of imaging for patients managed by a general practitioner, physiotherapist, osteopath, medical specialist or chiropractor ignorant in biomechanical interpretation of X-ray image for the application of a specific adjustment.

For a Gonstead chiropractor the image helps identify the true subluxation and suggests the precise point of contact and specific line of correction to make the safest most affective adjustment.

When adjusting the lumbar spine of a patient the practitioner is obliged to gain consent after advising them of risks from the procedure to be utilised. The practitioner should warn them about risks of injury to lumbar discs and the risk of exacerbation of nerve injury. I certainly concur that the application of any technique to the human body is not without risk, but strongly feel this is markedly mitigated on viewing the X-Ray image.

Both an L5 subluxation and a base posterior sacral subluxation may show a nervoscope reading, a lumbosacral fixation on motion palpation, localised tenderness and oedema. Certainly, there are subtle and at times apparently clear examination signs of difference between the two. However, it concerns me as to what would happen in the case of a BP sacrum listing to the already traumatised fibres of the disc annulus, if the practitioner naively contacted and thrust through the L5 vertebra. This concern is salient considering the safety and effectiveness demonstrated in this case series.

Conclusion

The 3 patients in this study showed a favourable and timely response to adjustment of their primary presenting subluxation, base posterior (BP) sacrum. Clear evidence of this improvement was confirmed with Oswestry lower back disability questionnaire and with pre and post X- Ray images.

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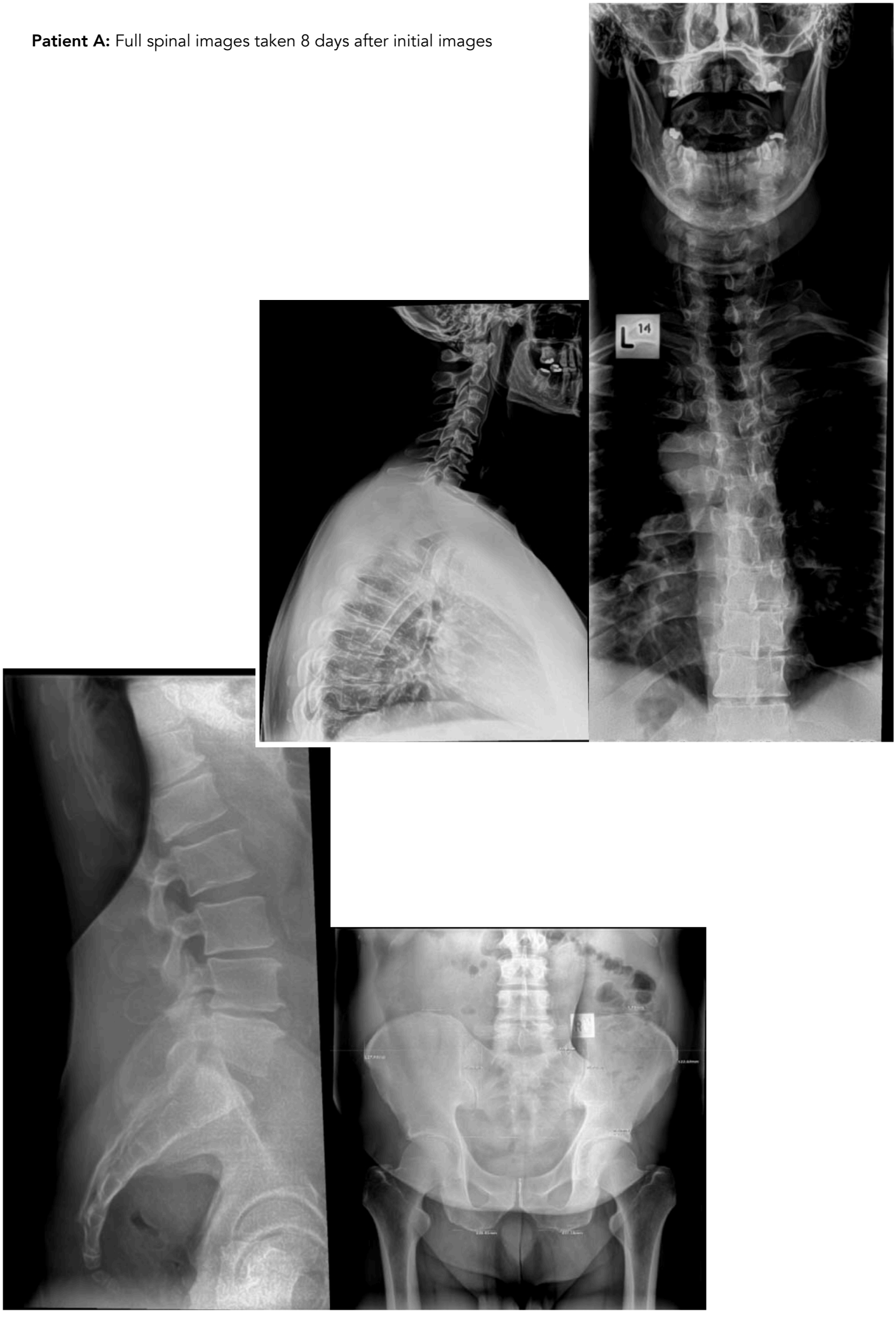
Summary table

	Oswestry Initial	Oswestry Final	Pre -X-Ray image Lateral Lumbar	Post X-Ray image lateral lumbar
Patient A	62%	0% Eight days later		
Patient B	34%	6% 7 days later		
Patient C	40%	12% 7 days later 6%< 1mth later		

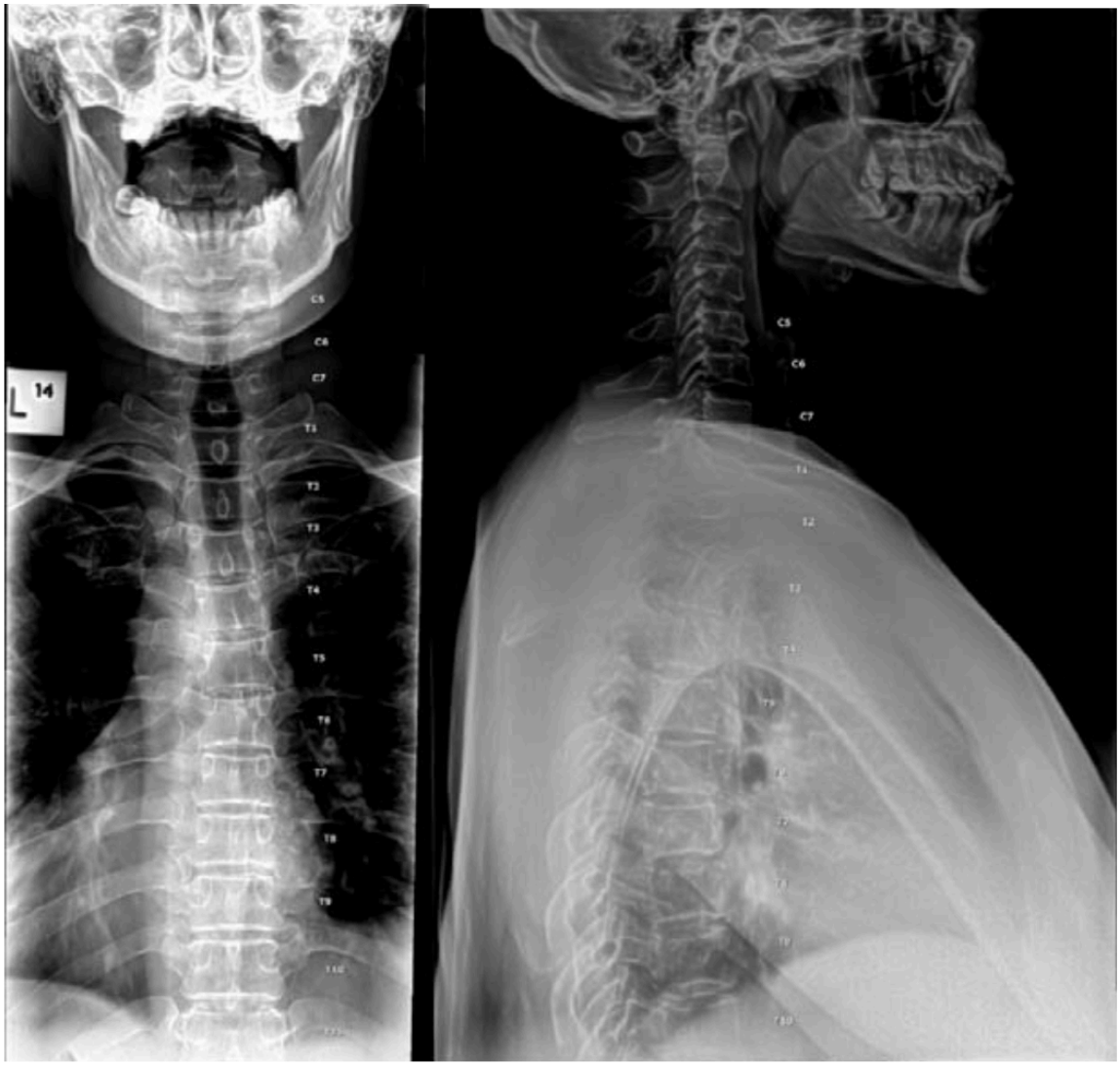
Images

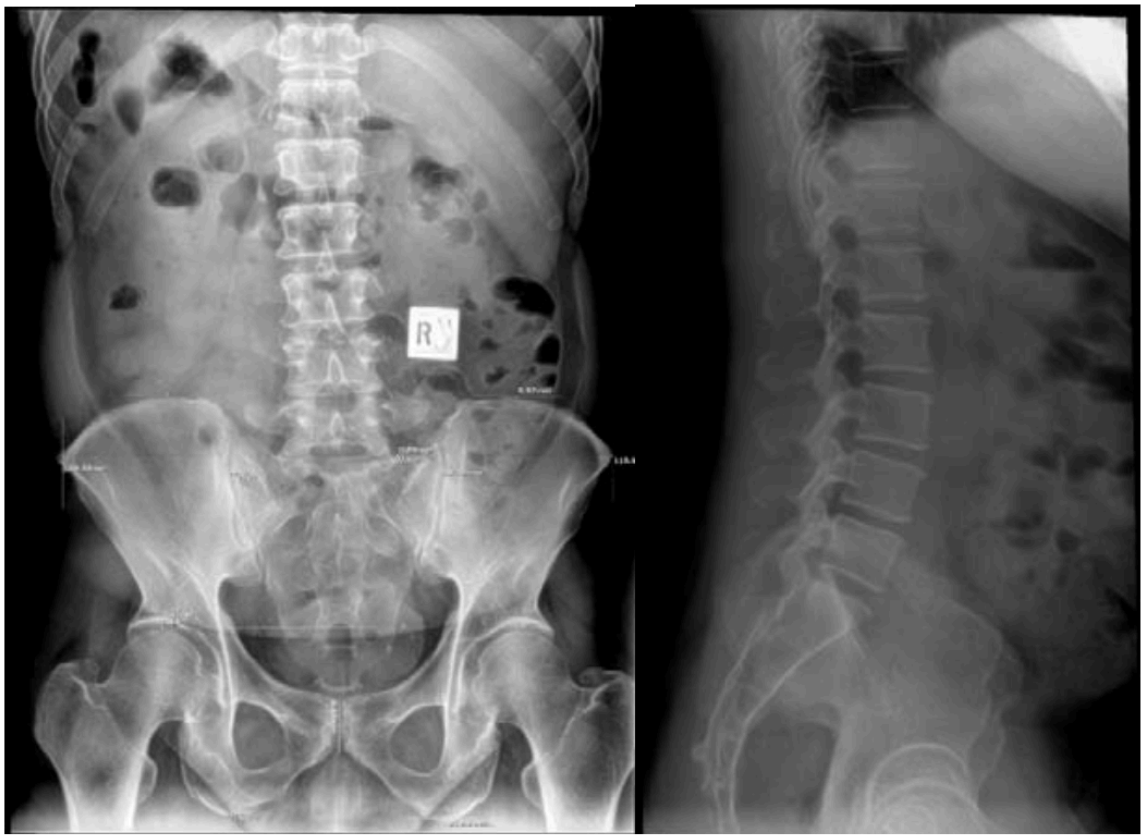
Patient A: Pre-treatment Lumbar AP and Lateral

Patient A: Full spinal images taken 8 days after initial images



Patient B: Pre-treatment AP and Lateral full spine X-ray images





Patient B: Lateral lumbar image taken 7 days after initial images

Patient C: Pre-treatment AP and Lumbar x-ray images

Patient C: AP and lateral lumbar images taken 14 days after initial images