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Original Article

Five Year Follow-Up on the Clinical Trial on Non-Surgical Spinal Decompression Using Vertebral Axial Distraction Delivered by a Computerized Traction Device

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ABSTRACT

Study Design: This is an observational, outcomes based study assessing the utility and efficacy of computerized long-axis lumbar traction.

Objective: To determine the long-term (5-year) outcomes of long-axis traction using a computerized axial traction approach. It was hypothesized that patients with low back pain who underwent computerized axial traction of the spine would have a reduced frequency of low back pain at five years.

Summary of Background Data: Over the last 50 years, different approaches utilizing a long-axis traction force have been applied to the cervical and lumbar spine in patients with radicular complaints. There have been a number of studies that describe the benefits of long-axis traction (see synopsis in the Appendix). Few studies have described the long-term clinical status utilizing long-axis traction.

Methods: From an original sample of 14 subjects that had low back and leg pain, 8 were selected for follow-up for this follow-up study. The outcomes tools utilized included The Revised Oswestry Low Back Pain Disability Questionnaire, and a survey prepared by the research team.

Results: Of the 8 patients selected to be surveyed, 7 responded by returning the questionnaires. Six of the seven indicated improvement following the traction treatment. There were 3 of 6 that had a return of symptoms at some point after the treatment and 3 of 6 that had resolution of pain. Of the total that responded to the treatment, 85.7% indicated that they would refer others for the procedure.

Conclusions: In this limited study, computerized axial traction was shown to reduce low back and leg pain for up to 5 years in 43% of the cases included and for at least 2 years in 86% of the cases. Patient satisfaction with the procedure was high, as evidenced by the number of patients who would refer others for the procedure.

INTRODUCTION

The benefits of axial traction have been known for some time[14]. Over the years several different modalities of traction have been developed and applied. Five years ago we performed a small pilot study looking at the feasibility of performing spinal decompression with a computerized axial traction device.[11,12,13,14] Although the study was small, patient satisfaction was high. This current study is a follow-up on patients who underwent the protocol five years earlier and completed the questionnaires at that time. We hypothesize that patients with low back pain who underwent our protocol of computerized axial traction of the spine have a reduced frequency of low back pain at five years.

REVIEW OF THE LITERATURE

The literature on this subject was reviewed in the original article. Since that time, a few case reports on computerized axial distraction have been observed as well as other articles. No five year follow-up of this type on the procedure was discovered.

CURRENT RESEARCH METHODS

REVIEW OF THE ORIGINAL PROCEDURE

In the original study[11], there were nine men and five women with low back (LB) and leg pain, ranging in age between 26-64. The range in chronicity for LB/Leg pain was 6 months to 29 years. Exclusion criteria included: Those with spinal fusions from hardware implant, those with non-disc related central spinal stenosis, those over age 70 or under age 18.

Intake measurements include modified Oswestry Low Back Pain Disability Questionnaire (Fairbanks, 1980) and the Neck Disability Index (Vernon and Mior, 1988) Activities Discomfort Scale (Turner, 1983) and a quadruple visual analogue pain scale (Yeomans, 2000). Each item was scored and the total recorded and compared to the exit scores. For this project, no objective tests or physical examination procedures were performed on intake or exit, only standardized outcomes assessment tools.

Patients who qualified to enter into the study were measured and fitted to the traction unit. Both prone and supine protocols were considered for lumbar decompression.[8 9 10] The prone position is usually recommended but can be modified per patient ability to tolerate the position. Precise positioning for each patient is critical for outcomes to be optimized A 100% compliance was expected from each subject accepted into the study in order to optimize the statistical analysis.

The specific treatment protocol was determined by the doctor after assessing the intake examination and evaluation. The computer controls the variations in the traction allowing for spinal decompression and is thought to reduce the muscle reaction and subsequent compression that can occur with some types of traditional or conventional traction devices. The preprogrammed patterns for ramping up and down the amount of axial distraction allows for optimal levels of spinal decompression and disc hydration when possible.

CURRENT PROCEDURE

Of the 14 subjects in the original study(Gundersen, B June 2004), 8 had low back and leg pain and were selected for this follow-up study. Two questionnaires were mailed to each of these patients: The Revised Oswestry Low Back Pain

Disability Questionnaire (Fig 1), and an additional, non-validated, survey prepared by the research team (Fig 2).

No fees for participation were paid to or charged to any patients. We did not seek approval from an IRB prior to performing this study.

DATA

Of the 8 patients surveyed, 7 responded and returned the follow-up questionnaires (Fig. 1& Fig 2) representing a response rate of 87.5%. Of the patients who responded, 85.7% recalled improvement after the treatment. Of those whose pain subsided, 3 of 6 had symptoms return sometime after, and 3 of 6 had resolution of pain. 85.7% stated that they would refer others for this procedure. The mean Oswestry score at the beginning of the initial study was 50.6 (ST DEV 31.5). Exit scores improved to 30.3 (ST DEV 28.7), and at five year follow up, Oswestry scores were 22.6 (ST DEV 14.3). See (Fig 3) for details of scores.

OBSERVATIONS

The response rate was high with 7 out of 8 patients returning surveys. It is interesting to note that the measured results initially parallel the results after five years. 50% of the patients who improved during the study maintained the improvement realized. 6 of the 7 who responded showed some improvement and 3 of 7 maintained the improvement for at least 5 years.

LIMITATIONS

The sample size is very small and statistically underpowered, therefore adequate statistical analysis could not be performed. This limits the conclusions that can be drawn. The original study was centered in one single private practice facility and no collaboration with other facilities was achieved. In addition there are many disease processes, aside from radiculopathy, that can refer pain unilaterally into the lower limb.[1] During the initial study, we did not select for specific disease processes. This prevents the authors from fully commenting on the nature of the outcomes measured initially and at five years. We hypothesize that the patients who presented with a more chronic degenerative process had return of pain. Those with an acute process had near resolution or complete resolution of pain. Future study should be directed at performing this procedure on specific patient populations with identifiable disease processes, such as radiculopathy or facet mediated pain, in a multi-centered fashion.

CONCLUSIONS

Computerized axial distraction may reduce low back pain and leg pain for up to 5 years in 43% of the cases studied in this follow-up and for at least 2 years in 86% of the cases. Patient satisfaction with the procedure was likely relatively high, as evidenced by the high number of patients who would refer others for the procedure. This may not be singularly due to the satisfaction with the procedure but skewed by frequency of contact, staff personable nature and other factors. The procedure was combined with electrical stimulation on every visit which may also account for some of the perceived or measured benefits resulting.[12] Further study in the form of a randomized control trial may provide additional information related to the appropriateness, safety, patient selection criteria and efficacy of this procedure. No patients were studied who did not have leg pain. Access to the original study was based on findings and results of comprehensive physical examination, review of imaging and other diagnostic studies. Patients who had low back pain with no leg pain were not studied. Patients with lower back pain only were excluded from the study as this procedure has not been shown to consistently perform in the absence of leg pain.[13] Careful selection of patients for this type of study is critical as patients with a variety of low back pain etiologies may be drawn in by current marketing strategies rather than the presence of frank radiculopathy.

References:

1. Mackenzie R: Mechanical diagnosis and therapy for disorders of the low back. In Taylor JR, Twomey LT (Eds.): Physical therapy of the low back. Churchill Livingstone, New York, 2000 p.26 & 143.
2. Kushlich SD, Ulstrom RN, Michael CJ: Tissue origin of low back pain and sciatica. Orthop Clin North Am (22): 181,1991.
3. Nachenson AL, Elfstrom G: Intravital dynamic pressure measurements of Lumbar discs. Scand J Rehabil Med 2 Supp 1:1-40, 1970.
4. Yong, Hing K., Kirkaldy-Willis WH:' Pathophysiology of degenerated discs of the lumbar spine. Phila. The Ortho Clinics of N. Am. Vol.(14) #3 July 83, p.p. 493504.
5. Bogduk N., Twomey L.: Clinical anatomy of the Lumbar Spine. ChurchillLivingstone New York. 1992. p.p. 68-69 & 151-173
6. Twomey LT.: Sustained lumbar traction: An experimental study of long spine segments. Spine 1985; (10): 146-149.
7. Judkovich BD.: Lumbar traction therapy-elimination of physical factors that prevent stretch. JAMA 1955; 159.
8. Gose E, Naguszewski L.: Vertebral axial decompression therapy: an outcome study. Neuro Resarch. (20)#3, April 1998.
9. Mathews JA.: Dynamic Discograhy: A study of lumbar traction. Annals of Phy Med, IX (7) 1968, p.p. 265-279.
10. Colachis SC.et al: Effects of intermittent traction on vertebral separation. Arch of Phy Med & Rehab 1972 (50), p.p.251-258.
11. Gundersen, B, Henrie, M Christensen, J; :A Clinical Trial on Non-Surgical Spinal Decompression Using Vertebral Axial Distraction Delivered by a Computerized Traction Device. Journal of the Academy of Chiropractic Orthopedists June 2004,
12. Demetrious, J; Annular tear of a cervical intervertebral disc treated with spinal manipulation and intermittent axial traction: a case report. JACO 6 Vol 1; March 2009
13. Unlu, Z, et al: Compariosn of 3 Physical Therapy Modalities for Acute pain in Lumbar Disc Herniation Measured by Clinical evaluation and Magnetic Resonance Imaging; JMPT March/April 2008,
14. Gary, R, et al: Evidence-informed management of chronic low back pain with traction therapy. The Spine Journal 8 (2008) 234-242,

FIG 2

(Not all respondents answered all items)

Five Year Follow-up Questionnaire with number of responses noted in red.

NAME _____
DATE_____

Five years ago, you participated in a clinical trial research project at the Personal Injury Clinic. The trial was for low back and leg pain. We would appreciate your answering the questions on this page and also completing the questionnaire enclosed as well and returning them both in the SASE.

Rate the value of the treatment in resolving your problem

1 I was worse after the treatment

2 I was the same after the treatment 1

3 I was some better after the treatment 1

4 I was very much better after the treatment 4

5 I was completely better after the treatment 1

Did your pain subside following the treatment? Y 6 N 1

If yes, did it return? Y 3 N 3

If yes, how soon (months) _____

Rate the degree of lasting improvement you had from the treatment

1 The improvement did not last 1 year

2 The improvement lasted 2 years 1

3 The improvement lasted 3 years

4 The improvement lasted 4 years 1

5 The improvement lasted 5 years 3

Did you have to seek other medical care for the symptoms studied in the project (low back and leg pain) 0

If yes, how soon?

What type of provider

Were you satisfied with the results there?

Would you refer others for this procedure? Y 6 N 1

Comments:

FIG 3

The Oswestry scores were compared to the original scores as follows

Patient	Complaint	Intake Score	Exit Score	Current Score
1	Low back and leg	44	10	16
2	Low back and leg	90	86	20
3	Low back and leg	8	2	0
4	Low back and leg	52	34	44
5	Low back and leg	38	18	18
6	Low back and leg	36	6	Did not respond
7	Low back and leg	28	16	24
8	Low back and leg	94	46	36
	MEAN SCORE	50.6	30.3	22.6
	ST DEVIATION	31.5	28.7	14.3

Fig 1

Revised Oswestry Low Back Pain Disability Questionnaire

PLEASE READ: This questionnaire is designed to enable us to understand how much your low back pain has affected your ability to manage your everyday activities. Please answer each section by circling the **ONE CHOICE** that most applies to you. We realize that you may feel that more than one statement may relate to you, but **PLEASE JUST CIRCLE THE ONE CHOICE WHICH MOST CLOSELY DESCRIBES YOUR PROBLEM RIGHT NOW.**

SECTION 1 - Pain Intensity
A The pain comes and goes and is very mild.
B The pain is mild and does not vary much.
C The pain comes and goes and is moderate.
D The pain is moderate and does nor vary much.
E The pain comes and goes and is severe.
F The pain is severe and does not vary much.

SECTION 2 – Personal Care
A I would not have to change my way of washing or dressing in order to avoid pain.
B I do not normally change my way of washing or dressing even though it causes some pain.
C Washing and dressing increases the pain, but I manage not to change my way of doing it.
D Washing and dressing increases the pain and I find it necessary to change my way of doing it.
E Because of the pain, I am unable to do some washing and dressing without help.
F Because of the pain, I am unable to do any washing or dressing without help.

SECTION 3--Lifting
A I can lift heavy weights without extra pain.
B I can lift heavy weights, but it causes extra pain.
C Pain prevents me from lifting heavy weights off the floor.
D Pain prevents me from lifting heavy Weights off the floor, but I can manage if they are conveniently positioned, eg, on a table.
E Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.
F I can only lift very light weights, at the most.

SECTION 4—Walking
A Pain does not prevent me from walking any distance.
B Pain prevents me from walking more than one mile.
C Pain prevents me from walking more than 1/2 mile.
D Pain prevents me from walking more than 1/4 mile.
E I can only walk while using a cane or on crutches.
F I am in bed most of the time and have to crawl to the toilet.

SECTION 5--Sitting
A I can sit in any chair as long as I like without pain.
B I can only sit in my favorite chair as long as I like.
C Pain prevents me from sitting more than one hour.
D Pain prevents me from sitting more than 1/2 hour.
E Pain prevents me from sitting more than ten minutes.
F Pain prevents me from sitting at all:

SECTION 6--Standing
A I can stand as long as I want without pain.
B I have some pain while standing, but it does not increase with time.
C I cannot stand for longer than one hour without increasing pain.
D I cannot stand for longer than 1/2 hour without increasing pain.
E I cannot stand for longer than ten minutes without increasing pain.
F I avoid standing, because it increases the pain straight away.

SECTION 7--Sleeping
A I get no pain in bed.
B I get pain in bed, but it does not prevent me from sleeping well.
C Because of pain, my normal night's sleep is reduced by less than one-quarter.
D Because of pain, my normal night's sleep is reduced by less than one-half.
E Because of pain, my normal night's sleep is reduced by less than three-quartets.
F Pain prevents me from sleeping at all

SECTION 8--Social Life
A My social life is normal and gives me no pain.
B My social life is normal, but increases the degree of my pain.
C Pain has no significant effect on my social life apart from limiting my more energetic interests, eg, dancing, etc.
D Pain has restricted my social life and I do not go out very often.
E Pain has restricted my social life to my home.
F I have hardly any social life because of the pain.

SECTION 9--Traveling
A I get no pain while traveling.
B I get some pain while traveling, but none of my usual forms of travel make it any worse.
C I get extra pain while traveling, but it does not compel me to seek alternative forms of travel.
D I get extra pain while traveling which compels me to seek alternative forms of travel.
E Pain restricts all forms of travel.
F Pain prevents all forms of travel except that done lying down.

SECTION 10--Changing Degree of Pain
A My pain is rapidly getting better.
B My pain fluctuates, but overall is definitely getting better
C My pain seems to be getting better, but improvement is slow at present.
D My pain is neither getting better nor worse.
E My pain is gradually worsening.
F My pain is rapidly worsening

Case Report

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Joint hypermobility syndrome (JHS) is a hereditary connective tissue disorder characterised by lax joints and the presence of musculoskeletal symptoms. The syndrome has been under-recognised and has only recently been taken more seriously.[1,2] Prevalence in children has been estimated at 10-25%.[1,2] Females tend to be affected more than males, and those of African or Asian descent appear to be affected more than Caucasians. JHS may underlie common orthopaedic problems such as back pain. Indeed, adolescent back pain is becoming increasingly prevalent as levels approach those of adults by late teens.[3] JHS has been cited as one of the most common differential diagnoses for back pain in children[4] and is a common reason for presentation to a rheumatologist in adults.[2] This is a case of paediatric back pain complicated by JHS.

Certain sequelae of JHS are common. These include acute ligament and soft tissue injury, overuse injuries, possible increases in fractures and a possible predisposition to degenerative joint disease after years of excessive joint motion.[5] Left untreated or undiagnosed, hypermobility may result in a chronic pain cycle and high levels of disability.[4] Further, it has been shown that there is increased pain sensitivity in teenagers who have had early pain experiences.[6]

There is some disagreement as to the definition of JHS and a number of scales have been used to aid diagnosis. Traditionally, the Beighton Score[7] (table 1) has been used to detect hypermobility. However, its clinical usefulness is sometimes questioned, primarily due to its focus on the upper body, which causes less disability than the lower limb, and the fact that, in the younger population, it has been suggested to over report hypermobility.[4]

A simple five-part questionnaire was devised by Hakim and Grahame[8] in 2003 (table 2) and has a sensitivity of 85% and a specificity of 90% for detecting hypermobility should patients answer yes to two or more of the questions. A further refinement has been developed in the form of the Brighton Criteria (table 3)[9] which also accounts for patient symptoms and is therefore useful in a clinical setting.

CASE REPORT

A 15 year old girl of Asian descent presented with low back pain of nine days duration with radiation anteriorly to the lower ribs. The problem had begun when awkwardly getting out of her bed. She described the pain as a dull tightness, escalating to shooting sharp pains on certain movements which she rated 8/10 in intensity. She consulted her general practitioner the following day and was prescribed co-codamol analgesia which was mildly relieving. She also noted a year long history of anterior rib pain on the left after walking long distances or carrying her school bag and discomfort in the upper back related to sitting and studying. She had already missed 2 weeks of school due to pain since the start of the year nine weeks ago, leading her mother to seek alternative care. At age three she was diagnosed with a scoliosis, which had self-resolved by the age of ten. She has always considered herself ‘double jointed’ and notes that her brother is too. She was able to answer yes to three of the five questions in the Hakim and Grahame[7] questionnaire for the detection of hypermobility (table 2).

Physical examination confirmed the presence of joint laxity and showed bilateral pes planus. The quadratus lumborum and external obliques were tender to palpation bilaterally. There were a number of tender and restricted areas in the thoracic

spine, but no neurological signs were present. JHS is a diagnosis of exclusion with rule-outs of Erlos Danlos syndrome, Marfan syndrome and juvenile idiopathic arthritis.

The diagnosis of JHS leads to questions about appropriate treatment options for this child's back pain. The presence of generalised joint laxity brings into question whether high velocity manual thrust techniques are appropriate. A search of the scientific literature over the past ten years was conducted to investigate the best evidence for appropriate care and its effectiveness in similar cases. The original paper outlining the Beighton Score[6] was included, despite falling outside the primary search time frame, for completeness.

DISCUSSION

There is no evidence specific to chiropractic care and the paediatric population with JHS. However there is some level four evidence (case report and case series)[10,11] investigating the use of manual therapy alongside functional rehabilitation training in this group. Table 4 shows the results of a large case series of individuals treated with a three week exercise programme where 69% of participants showed improvement at six week review. There was a significant positive relationship between age and outcome. This may be explained by other factors, such as onset of puberty, natural stiffening up over time or greater compliance in older children.

Such minimal evidence as there is suggests that manual therapy alongside functional rehabilitation training - with an emphasis on improved motor control, proprioception and strength-endurance[10,11] may lead to long term amelioration of low back pain in hypermobile patients. Treatments focus on improving muscle control in the presence of ligamentous insufficiency to help minimise trauma to joints. It is commonly recognised that children respond well to muscle-strengthening exercises – although muscle bulk may not increase as improvement in strength and neuromuscular co-ordination results in more efficient muscle use.[4]

It is interesting to note that our patient was very active, swimming competitively until a year ago when she decided to focus on her studies. The cessation of activity coincided with the onset of back and rib pain. Modification of activities, alongside rehabilitation exercises are suggested from the literature to be the key to improved outcomes in the presence of JHS.[10,11] The patient has been instructed in daily proprioceptive exercises and early-stage core isometric strengthening exercises within neutral posture. She has been treated with gentle myofascial therapy and post-isometric relaxation to the quadratus lumborum, the external obliques and the upper trapezius.

The patient rated her pain as 8 on the Numerical Rating Scale (NRS) which spans 0 to 10, where 0 is no pain and 10 is the most or worst pain. Although the NRS has been studied extensively in adults and has good evidence of acceptability, reliability and validity, there is little data to support the use of the NRS in the paediatric population. However, there is some indication that the scale is useful for children eight years and older.[12] The patient's self-reported pain was reduced from 8/10 to 6/10 as of treatment number five.

The NRS value remained relatively high. It has been shown that pain is often the last thing to improve in the presence of continuing joint laxity and when it does, it only does so slowly. This is an important point to emphasise at the start of treatment.[4] The clinical course of patients with JHS may be one of ups and downs as patients are subject to recurrent soft tissue injury, a further point of note when discussing treatment options with patients.[4]

CONCLUSION

JHS is a common cause of musculoskeletal symptoms in childhood[4] and should be borne in mind for all paediatric patients as ligament laxity may be the rule rather than the exception. The condition should be diagnosed prior to commencement of treatment and the goal of therapy should be stabilisation of lax joints rather than manipulation, which may result in destabilisation.

This case report illustrates a relatively common presentation of adolescent low back pain. The case emphasizes the importance of early recognition of JHS and its impact on patient management, as it needs to be long-term. A multimodal treatment approach combining myofascial therapy with proprioceptive exercises is important in amelioration of long term pain.

REFERENCES:

1. **Grahame R, Joint hypermobility and genetic collagen disorders: are they related?, Arch Dis Child, 1999; 80:188-91**
2. **Grahame R and Hakim A. High prevalence of joint hypermobility syndrome in clinic referrals to a north London community hospital. Rheumatology 2004;43(2):ii91**
3. **Davies K and Copeman A, The spectrum of paediatric and adolescent rheumatology, Best Pract Res Clin Rheumatol, 2006;20(2):179-200**
4. **Murray KJ, Hypermobility disorders in children and adolescents, Best Pract Res Clin Rheumatol, 2006;20(2):329-51**
5. **Simpson MR, Benign joint hypermobility syndrome: evaluation, diagnosis and managmenent, JAOA, 2006; 106: 531-36**
6. **Hermann C, Hohmeister J, Demirakca S, Zohsel K and Flor H, Long-term alteration of pain sensitivity in school-aged children with early pain experiences. Pain 2006;125;278-285**
7. **Beighton P, Solomon L and Soksolne CL, Articular mobility in an African population, Ann Rheum Dis, 1973;32:413-18**
8. **Hakim A and Grahame R, A simple questionnaire to detect hypermobility: an adjunct to the assessment of patients with diffuse musculoskeletal pain, Int J Clin Pract, 2003;57(3):163-66**
9. **Simmonds JV and Keer RJ, Hypermobility and the hypermobility syndrome, Man Ther, 2007;12:298-309**
10. **Kerr A, Macmillan CE, Uttley WS and Luqmani RA, Physiotherapy for Children with Hypermobility Syndrome, Physt, 2000;86(6):313-17**
11. **Simmonds JV and Keer RJ, Hypermobility and the hypermobility syndrome, Part 2: Assessment and management of hypermobility syndrome: Illustrated via case studies, Man Ther, 2008;13:e1-11**
12. **von Baeyer CL, Spagrud LJ, McCormick JC, Choo E, Neville K and Connelly MA, Three new datasets supporting use of the Numerical Rating Scale (NRS-11) for children's self-reports of pain intensity. Pain, 2009;doi:10.1016/j.pain.2009.03.002**
13. **Post-treatment Bournemouth Questionnaire reproduced with kind permission from the AECC, http://www.aecc.ac.uk/research/bmth_questionnaire/index.asp**

Table 1 The Beighton score for assessing hypermobility[6]

Numerical score of 0-9 generated via the following:
One point for ability to perform each of the following tests:

- Passive dorsiflexion of the little fingers beyond 90°
- Passive apposition of the thumbs to the flexor aspects of the forearms
- Hyperextension of the elbows beyond 10°
- Hyperextension of the knees beyond 10°
- Forward flexion of the trunk, with knees straight, so that the palms of the hands rested easily on the floor

One point for each affirmative answer to the following questions:

- Any pains in the hands or feet?
- Any other joint pains?
- Any backache?
- Any other pains in the limbs?

Table 2 - 5 point hypermobility questionnaire [7]

- **Can you now [or could you ever] place your hands flat on the floor without bending your knees?**
- **Can you now [or could you ever] bend your thumb to touch your forearm?**
- **As a child, did you amuse your friends by contorting your body into strange shapes or could you do the splits?**
- **As a child or teenager, did your kneecap or shoulder dislocate on more than one occasion?**
- **Do you consider yourself "double-jointed"?**

Table 3 Brighton criteria for joint hypermobility syndrome (after Grahame et al., 2000 in Simmonds and Keer [8])

Major criteria

1. A Beighton score of 4/9 or greater (either currently or historically)
2. Arthralgia for longer than 3 months in four or more joints

Minor criteria

1. A Beighton score of 1, 2 or 3/9 (0,1,2 or 3 if aged 50+)
2. Arthralgia (for 3 months or longer) in one to 3 joints or back pain (for 3 months or longer), spondylosis, spondylolysis or spondylolisthesis
3. Dislocation/subluxation in more than one joint, or in one joint on more than one occasion
4. Soft tissue rheumatism: three or more lesions (e.g. epicondylitis, tenosynovitis, bursitis)
5. Marfanoid habitus (tall, slim, span/height ratio > 1.03, upper:lower segment ratio < 0.89, arachnodactyly (positive Steinberg/wrist signs)
6. Abnormal skin striae, hyperextensibility, thin skin, papyraceous scarring
7. Eye signs: drooping eyelids or myopia or antimongoloid slant
8. Varicose veins or hernia or uterine/rectal prolapse

Joint hypermobility is diagnosed in the presence of two major criteria or one major and two minor criteria, or four minor criteria. Two minor criteria will suffice where there is an unequivocally affected first-degree relative.

Table 4 Results of a case series where JHS was treated with a 3 week exercise programme[9]

- 39 participants, 2-14 years of age
- Diagnosis of JHS using the Beighton Score[6]
- 3 week exercise programme with 6 week follow-up
- 69% were improved at 6 week review (using global scale of patient-reported symptomatic relief)
- 15% had complete resolution of symptoms
- The older the child the lower the Beighton Score[6] at onset of symptoms (significant negative relationship between the two ($R = -0.53$; $P < 0.01$))
- Significant positive relationship between age and outcome ($R = 0.4$; $P < 0.01$)

Table 5 Case study of a 16 year old male student with JHS and chronic back pain[10]

- 16 year old male high school student with chronic low back pain
- Diagnosis of joint hypermobility syndrome and Marfanoid habitus
- Treatment with postural education, lumbar control exercises, gentle mobilisation of upper lumbar and lower thoracic segments, soft tissue release of lumbar and thoracic paraspinal muscles, proprioception and strength endurance
- 17 week programme
- Patient self-assessment reported 90-95% improvement, almost complete resolution of back pain and improved spinal and lower limb movement control

Table 6 The Bournemouth Questionnaire[12]

1. Over the past few days, on average, how would you rate your pain on a scale where '0' is 'no pain' and '10' is 'worst pain possible'?

   No pain ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

2. Over the past few days, on average, how has your complaint interfered with your daily activities (housework, washing, dressing, lifting, walking, reading, driving, climbing stairs, getting in/out of bed/chair, sleeping) on a scale where '0' is 'no interference' and '10' is 'completely unable to carry on with normal daily activities?

   No interference ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

3. Over the past few days, on average, how much has your painful complaint interefered with your normal social routine including recreational, social and family activities, on a scale where '0' is 'no interference' and '10' is 'completely unable to participate in any social or recreational activity'?

   No interference ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

4. Over the past few days, on average, how anxious (uptight, tense, irritable, difficulty in relaxing/concentrating) have you been feeling, on a scale where '0' is 'not at all anxious' and '10' is 'extremely anxious'?

   Not at all anxious ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

5. Over the past few days, how depressed (down-in-the-dumps, sad, in low spirits, pessimistic, lethargic) have you been feeling, on a scale where '0' is 'not at all depressed' and '10' is 'extremely depressed'?

   Not at all depressed ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

6. Over the past few days, how do you think your work (both inside the home and/or employed work) have affected your pain, on a scale where '0' is 'make it no worse' and '10' is 'make it very much worse'?

	0	1	2	3	4	5	6	7	8	9	10
Make it no worse	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

7. Over the past few days, on average, how much have you been able to control (help/reduce) and cope with your pain on your own, on a scale where '0' is 'I can control it completely' and '10' is 'I have no control whatsoever'?

	0	1	2	3	4	5	6	7	8	9	10
I have complete control over my pain	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

8. Since beginning treatment at this clinic, how would you describe the change (if any) in ACTIVITY LIMITATIONS, SYMPTOMS, EMOTIONS or OVERALL QUALITY OF LIFE, related to your painful condition (tick ONE box)

No change (or condition has got worse)…… ☐
Almost the same, hardly any change at all…….. ☐
A little better, but no noticeable change……. ☐
Somewhat better, but the change has not made any real difference……..... ☐
Moderately better, and a slight but noticeable difference…… ☐
Better, an d a definite improvement that has made a real and worthwhile difference….
A great deal better, and a considerable improvement that has made all the difference…

Diagnostic Imaging Corner

Case Challenge

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CASE HISTORY

A 16 year old female presented to a chiropractor in France with a history of a car accident within the previous week, where she had been a passenger in the rear of the car, which was hit from the back. No initial pain was felt, and following a visit to the emergency room/casualty, the patient was discharged. The patient then presented to the chiropractor with her mother to be examined for pain in her knees. The patient was already aware of a bony disorder that she suffered with, from an earlier age, which in general did not cause her any problems.

A

B

- **What are the imaging findings?**
- **What is your clinical/imaging diagnosis?**
- **What would your clinical management entail?**

WHAT ARE THE IMAGING FINDINGS?

Digital radiographs of the right knee, AP (1a) and lateral (1b) following a road traffic accident in a 16 year old female which demonstrate multiple bony outgrowths (osteochondromas/exostoses) affecting the proximal tibia and fibular, as well as distal femur which also demonstrates mild bony expansion.

WHAT IS YOUR CLINICAL/IMAGING DIAGNOSIS?

Hereditary multiple exostosis (HME). There is no evidence of osseous trauma in the region of the osteochondromas, or elsewhere in the region imaged.

WHAT WOULD YOUR CLINICAL MANAGEMENT ENTAIL?

The clinical management of a patient with hereditary multiple exostosis will include adapting the approach to not include adjusting directly over a region with particularly a pedunculated osteochondroma, due to the possible fracture that may be induced. In addition, the clinician should remain astute with a patient affected by HME of any lesion that becomes painful, or around which a soft tissue mass is noted to be developing, since in a small percentage of patients, aggressive/malignant tumours may arise. No information is however available in the current literature describing the clinical chiropractic management of a patient with HME although one case report was provided of a patient presented to the chiropractic practice with HME. The report mentions that no treatment was offered for the patient but that they were counseled for the potential risks including malignant degeneration (1). This patient was treated with soft tissue techniques as well as joint stimulation.

DISCUSSION:

Hereditary multiple exostosis (HME) is a condition in which osteochondromas produce overgrowth of the metaphyseal regions of multiple bones. As the name implies, this is most often an inherited autosomal dominant condition, with 96% penetrance and has also been referred to as diaphyseal aclasis, referring to the abnormal development or modeling of bone. Other terms include external chondromatosis, or multiple osteochondromatosis. The two genes most strongly associated with HME, EXT1 and EXT2, are involved in the regulation of chondrocyte proliferation and differentiation during enchondral bone development (2).

Hereditary multiple exostosis occurs in both genders and is typically detected between the ages of 2 and 10 years old, most often by age 3 and is slightly more common in males than females (1.5:1). In 10% of the patients and as in this case, there is no family history, with the HME occurring sporadically. As the metaphyseal overgrowth occurs with the developing osteochondromas, the slowly growing, typically painless lumps or masses will be palpated, typically first by the child or guardian, with eventual presentation to a clinician, although sometimes HME comes to clinical light when imaging is performed for an unrelated reason, for example on a chest x-ray performed for a non-musculoskeletal condition. Most osteochondromas associated with HME affect the lower limb, especially the proximal and distal tibia, as with this patient, but virtually any bone may be affected, including long, flat, irregular and tubular bones (3).

With upper extremity involvement, there may be bowing of the forearm, typically affecting primarily the ulna. Although the ulna shows overgrowth, it actually appears to be shorter than the radius, due to the bowing. Protruberances from the bone surface may cause symptoms related to the pressure effect of the osteochondroma, leading to bursitis, tendinitis, even the development of neurovascular abnormalities such as aneuyrsms or pseudoaneurysms. Fracture of the osteochondroma is a relatively common complication, especially when it is pedunculated (has a distinct stalk) rather than sessile (broad-based). Other common deformities include short stature, limb-length

discrepancies, valgus deformities about the knees and ankles, Madelung's deformity and asymmetry of the scapula and pelvic girdle. Neurologic complications may occur depending on the location of the osteochondroma, such as a case that was published of Brown-Sequard syndrome developing in a young patient with an exostosis affecting the cervical spine (4).

On conventional radiography, an osteochondroma is seen as an osseous density protruding from the bone with direct extension of the cortex of the parent bone around the ostechchondroma. When HME is detected, the work-up may include a skeletal survey, with focus on the ends of the long bones, including the shoulder and pelvic girdles, elbows, wrists and hand, knees and ankles. Depending on access to further imaging, ultrasound over the osteochondroma or magnetic resonance (MR) imaging may be utilized in order to evaluate the thickness of the cartilage cap surrounding the osteochondroma, especially in a case where there is clinical concern for malignant transformation. The most serious complication of HME is malignancy, most often a chondrosarcoma, arising from a previously benign osteochondroma, such as in the case published of a secondary chondrosarcoma arising from the cuboid bone of an osteochondroma in a patient with HME (5). This is significantly more common in HME than in individuals with a single osteochondroma and no HME. The potential for malignant transformation may vary with the thickness of the cartilage cap, the thicker the cap the more likely for malignant transformation. The final diagnosis of HME is made with a combination of the imaging findings, histology if available as well as the clinical history of both the patient and family. With malignant transformation, a patient may note pain in a previously non-painful region affected by an osteochondroma, or a newly growing soft tissue mass may be noted either by the patient or the clinician. In such a case, further imaging is required and MRI with and without contrast is the examination of choice, although ultrasound can be helpful, especially if MRI is not immediately available.

Treatment of HME depends on the clinical situation. If the patient is symptomatic or there is unwanted cosmetic deformity, orthopedic surgical techniques are available which attempt to realign the region involved. For example surgery may be performed on the wrist if the ulna and/or radius are affected. Bone lengthening procedures can also be used to improve the osseous relationships. Clinical observation needs to remain vigilant so as to determine the presence of clinical symptoms and signs that may suggest malignant degeneration, as previously discussed.

CONCLUSIONS:

Osteochondromas are typically resected only if symptomatic, causing functional impairment, for cosmetic reasons or due to malignant transformation.

The complication associated with HME to be most wary about is that of malignant degeneration, a risk ranging from 1-2% in those patients less than 21 years old, to 20 %, with increasing age. The risk of developing a chondrosarcoma in HME is higher for those osteochondromas situated near the pelvis, scapula, proximal humerus, proximal femur and spine.

CLINICAL PEARLS:

Development of a chondrosarcoma originating from an osteochondroma associated with HME may be suggested if the patient or clinician notes an increase in the size of the lesion on physical examination or if the patient develops pain in this region affected by the osteochondroma.

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REFERENCES:

1) Pikula JR; Hereditary multiple exostosis: a case report, J Can Chiropr Assoc, 1996; 40(1)
2) Judith VMG Bovée; Multiple osteochondromas, Orphanet J Rare Dis. 2008; 3: 3.

3) Jones KB and Morcuende JA; Of Hedgehogs and Hereditary Bone Tumors: Re-Examination of the Pathogenesis of Osteochondromas, Iowa Orthop J. 2003; 23: 87–95
4) Han IH and Kuh SU; Cervical Osteochondroma Presenting as Brown-Sequard Syndrome in a Child with Hereditary Multiple Exostosis, J Korean Neurosurg Soc. 2009 May; 45(5): 309–311.
5) Chadha M and Singh A; Secondary chondrosarcoma of the cuboid bone in a patient with multiple exostoses Can J Surg. 2008 February; 51(1): E5–E6.
Further reading:
Taylor J, Hughes T and Resnick D (2010); Skeletal Imaging: Atlas of the Spine and Extremities, 2nd edition, Elsevier, USA
http://www.radiologyteacher.com/index.cgi?&nav=view&DatID=688

Abstracts & Literature Review

Carotid Dissection from Weight Lifting; A Case Study: An Editorial Review. JACO 2010 Guruman Kalra, MD Consultants Live.com Vol 49, No. 6 © 2010

JACO Editorial Reviewer J. R. Brandt DC, MPS, FACO

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JACO Editorial Summary

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The presentation in this case is typical for headache and neck pain. The importance of the history of onset cannot be over looked. A 37 yr. old male weight lifter presents with headache and neck pain that began the day prior after lifting weights.

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The following day he developed left side weakness and syncope with left side facial droop.

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The patient was admitted to the hospital with diagnosis of stroke. CT angiogram revealed bilateral internal carotid dissection.

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Carotid artery dissection associated with sports and other physical activities is an increasingly recognized, although still underestimated, cause of stroke in young patients. Sports-related carotid dissection typically occurs in older patients (aged 40-45 years). Weight lifting is an uncommon cause of sports-related carotid dissection. In this case, the patient was advised to stop weight lifting.

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CONCLUSION:

Clinicians should be alert to young athletes with headache, facial droop, neck pain, unilateral extremity weakness and bouts of syncope.

REFERENCES:

1. Norris JW, Brandt T, Management of Cervical Arterial Dissection. Int J Stroke. 2006; 1-59-64.
2. Cervical Artery Dissection in Stroke Study Trial Investigators. Antiplatelet therapy vs anticoagulation in cervical artery dissection: rationale and design of the Cervical Artery Dissection in Stroke Study (CAISS) Int J Stroke. 07; 2:292-296.
3. Dharmasaroja P, Dharmasaroja P. Sport-related internal carotid artery dissection: pathogenesis and therapeutic point of view. Neurologist 2008; 14: 307-311.

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