International Journal of Osteopathic Medicine (2014) 17, 206—210

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International Journal of Osteopathic Medicine

www.elsevier.com/ijos

The runner's kidney: A case report

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Received 17 September 2012; revised 10 June 2013; accepted 18 January 2014

KEYWORDS
OMT;
OMM;
Osteopathy;
Case report;
Visceral manipulation

Abstract Kidney somatic dysfunction could be easily missed when treating a runner as pain in runners is usually biomechanical. In this case report, a 51 year old woman with pain in her gluteus while running is presented. After treatment with physical therapy and structural osteopathic manipulation, there was no improvement. Once the key lesion (a second degree kidney ptosis) was found and treated, the patient could resume her training without any pain.

Introduction

Participation in sport is beneficial for the management of the risk factors associated with obesity, cardiovascular disease, and diabetes.[1] However, participation without appropriate training can lead to physical injury.[2] When assessing the medical history, practitioners should include in their clinical reasoning, information about training activities as this often provides a useful diagnostic insight into the patients complaint. Endurance athletes such as runners, cyclists or triathletes, commonly develop overuse injuries.[3] It is common for runners to develop problems such as psoas syndrome, low back pain, ilio-tibial band syndrome and patellofemoral syndrome.[4] This paper describes the case of a 51 year-old triathlete could not run more than one kilometre without pain, and was initially treated for piriformis syndrome without significant change in symptoms.

Case presentation

This case report was written with the consent of the patient and personal details are kept anonymous. A 51-year old woman presented to a physical therapist on the recommendation of her medical doctor after experiencing pain in the right gluteal area while running a half-marathon (21.1 km) in May 2011. After the event, she began to experience right gluteal pain after running a few kilometres (not more than 5 km). The patient had many races planned in her schedule including a half-ironman triathlon (1.9 km swim, 90 km cycling

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http://dx.doi.org/10.1016/j.ijosm.2014.01.002

and 21.1 km of running) and many other preparatory races before this event. She felt that her gluteal muscles were 'tight'. The patient reported that she had been undertaking a lot of cycling to compensate for the lack running, as well as undertaking a substantial amount of stretching. The pain was not affecting her routine activities of daily living and she took ibuprofen to manage the gluteal pain during exercise.

The patient did not have any recent trauma or major illness. She had a history of mild asthma and mild seasonal allergy. Her surgical history included a caesarean operation in 1989 and she had history of tendinitis of the right shoulder in 2000. The patient's social, medical and family history was non-contributory.

At the time of presentation, the patient had been undertaking some strengthening of the hip musculature and stretching for the hamstrings as recommended by the physical therapist. After one month of treatment without any major improvement of her physical condition, the physical therapist referred the patient to a manual osteopathic practitioner (the author) in order to receive osteopathic manipulative therapy (OMTh).

Examination

Physical examination revealed normal muscle strength (5/5) of the lower limb bilaterally. Patellar and Achilles deep tendon reflexes were +3/4 bilaterally. Her passive range of motion of the lower limb was normal on the left side. When compared to the left hip, passive motion of right hip flexion revealed a restriction of 30% and right hip external rotation of 50%. Running gait was analysed by visual analysis on a motorised treadmill over a period of 10 min while wearing light trainer running shoes that were the patient's regular choice of training footwear. Analysis of the patient's running cycle revealed that she was predominantly landing with a forefoot strike.[5]

The osteopathic structural examination identified:

- an apparent sacrum severely rotated to the left;
- a right anterior rotation of the ilium;
- L3-L5 vertebrae were neutral, rotated on the right and sidebent on the left;
- right psoas muscle spasm;
- right piriformis tender point; and
- a second degree kidney ptosis (an inferior drop of one centimetre) with external rotation.[6]

Palpation of the right kidney was associated with a spasm of the psoas muscle and there was an impression of adherence of the right kidney to the diaphragm muscle.

Treatment

Osteopathic manipulative treatment (OMT) was used to address the identified somatic dysfunctions. Somatic dysfunction has been defined as "impaired or altered function of related components of the somatic system: skeletal, arthrodial, and myofascial structures, and related vascular, lymphatic, and neural elements.[7] Somatic dysfunction is characterised by tissue texture changes, an asymmetry of structure, a restriction of motion and/or tenderness to palpation.[7] Kidney somatic dysfunction is characterized on palpation by an apparent restriction of motility on its axes of movement (caused by ptosis) and is accompanied by tenderness on palpation.[6,8]

At the first treatment, the psoas and piriformis were treated with strain/counterstrain technique.[9] Muscle energy technique (MET) was used to treat the sacral and lumbar dysfunction.[10] MET, general osteopathic treatment (GOT) and peripheral neural facilitations (PNF) were used to treat the restricted range of motion of piriformis, psoas and hamstrings. Deep breathing exercises using the diaphragm were taught to the patient and she was asked to maintain the exercise program prescribed by the physical therapist. She was also asked to attempt resuming running whilst noting the distance covered at which symptoms occurred.

There were no significant results one week after the first treatment, and the patient reported being able to run 3 km without any pain. The second treatment focused on addressing the apparent somatic dysfunction of the right kidney. A combined direct technique was applied (Fig. 1).[8]

At the time of third consultation one week later, the patient reported that she was completely relieved from her pain and could run 15 km without any discomfort. A re-assessment was made and there was a restoration of hip ROM (a gain of 20% on the right hip flexion and 30% on the external rotation), and no apparent somatic dysfunction of the hip and sacrum. The only remaining dysfunction was a mild change in tissue texture on palpation over the right diaphragm. Deep breathing exercise was given to the patient in order to execute a self-mobilisation of the diaphragm (Fig. 2). The patient was asked to take ten deep

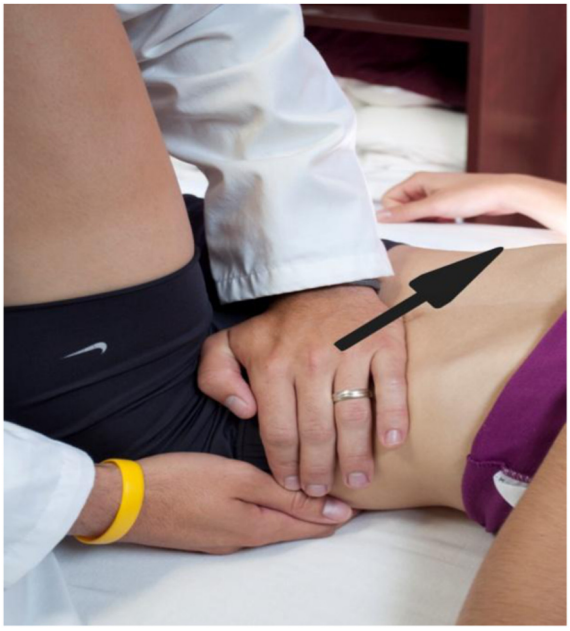

Fig. 1 Direct correction of the kidney with a second degree ptosis and external rotation. To perform this technique, the patient is positioned supine on the plinth with hip flexion of the affected side. The hip flexion aids the osteopath in the psoas muscle tension by using low force isometric contractions. The hand underneath the patient's lower back helps to monitor and stabilise the main action. The hand on the kidney/psoas track make a deep pressure to reach the kidney and then goes upward and inward on the psoas rail. The clinician immediately feels the change in tenderness of the tissues after the technique. The patient could also feel the technique work when he or she starts to feel some relief. As with all other OMT, the communication with the patient is really important for the success of the technique.

breaths twice a day in sitting position. The long term goal of the exercise is to create a habit of diaphragm breathing in the patient. At [telephone] follow-up after conclusion of the patient's race season revealed that she had completed all her planned races and had not experienced any further gluteal symptoms.

Discussion

Manual manipulation of the kidneys has been previously reported in patients presenting with non-specific lumbar pain (LBP).[11] There appears to be no peer reviewed literature suggesting that assessment for the presence (or otherwise) of somatic dysfunction of the kidney in runners or other athletes is indicated. Based on an anatomical concept, the use of osteopathic kidney manipulation may be reasoned[12] on the basis that the kidney has no fixed attachments, unlike other viscera, and is mainly held in place by the adipose renal capsule. The kidney is supported by the diaphragm's fascia and is pressed against the liver and the colon.[12] This relationship with the diaphragm could be an explanation of the pain genesis in the present case, which may be linked with the patient's mild asthma or seasonal allergy. The use of deep breathing technique could also be used to promote mobility between the kidney and the diaphragm.

The kidney is also attached by fascia to the psoas muscle which is called the "kidney's rail".[6] The anatomical relationship with the psoas muscle may be the primary cause of pain while running because this muscle appears to be vulnerable to overuse with repeated hip flexion. Through fascial connections, we can extrapolate that the influence of somatic dysfunction of the kidney could pull on the quadratus lumborum, which pulls on the thoraco-lumbar fascia thereby inducing a rotation of the sacrum.[13]

Once the sacrum is rotated to the left, it could create a tender point on the piriformis muscle. In our case, the OMT used to treat the piriformis tender point was the muscle energy technique and strain/counterstrain. The right gluteal pain was still present after the application of these OMTs and suggested that the initial dysfunction could come from the kidney. The 'key' dysfunction was a second degree ptosis (dropped inferior with more than a centimetre and externally rotated) which was hypothesised to have led to the development

Fig. 2 The patient is seated and relaxed. The inspiration is through the nose and exhaling through the mouth with the tongue attached to the palate. It is important to visualize the diaphragm as a piston which moves back and forth constantly.

Table 1 Trainings session for running. A 10% distance progression was applied to the long run each week and started at 13 km. The goal is to add distance without any pain. The goal of intervals training was to increase the training zone without pain related to the injury. A recovery run was added in the middle of the week. There was 48 h of recovery between each running session.

Week/day	Interval training	Medium running session	Long run training
1	1 km warm up zone 2 4 × 400 m zone 3 (2 min passive rest between sets) 1 km cool down zone 1	5 km zone 2	13 km zone 2
2	1 km warm up zone 2 4 × 400 m zone 4 (2 min passive rest between sets) 1 km cool down zone 1	5 km zone 2	14.3 km zone 2
3	1 km warm up zone 2 4 × 400 m zone 5 (2 min passive rest between sets) 1 km cool down zone 1	5 km zone 2	15.6 km zone 2
4	1 km warm up zone 2 6 × 400 m zone 3 (2 min passive rest between sets) 1 km cool down zone 1	5 km zone 2	16.9 km zone 2

of the other somatic dysfunctions and the patient's pain.

The potential causes of this second degree ptosis of the kidney could be:

1. The past caesarean operation that could have created adherences through the surroundings fascias that could have pulled the kidney. The caesarean's scar was not addressed in this case since it was more than 20 years old and that the patient did not report any pain related to it, but for general recommendation, clinicians may assess the scar tissue in order to identify potential adherence of the fascia tissue; and/or the cross-gait issues in running from having a shoulder girdle injury in the past as well as a pelvic girdle presentation pattern may add to the injury pattern if through the fascia's.
2. The repetitive hip movement with running may help the kidney to slip on its 'rail'. The continuous impact of running may facilitate the ptosis of the kidney as many miles were added in her training routine. The cumulative impact of running may be a factor, so a 10% distance per week progression was suggested as well as a slow progression of intervals running sessions (Tables 1 and 2). The goal of this progression is to let all the structures of the body the chance to adapt to running.

The use of ultrasound imaging could be an interesting tool to assess the ptosis and to see if the technique worked. It was not used in this present case because legislation in the province of Quebec, Canada, does not allow an osteopath to use ultrasound imaging.[14] This investigation could be easily done by an osteopathic physician in the United-States.

Table 2 Training zones. Heart rate is calculated using the 220- age formula or by a VO_{2max} test.

Zones	Borg scale (/10)	Heart rate	Intensity
1	0—2	50—60%	Very easy
2	3—4	60—70%	Easy
3	4—6	70—80%	Moderate
4	7—8	80—90%	Difficult
5	9—10	90—100%	Very difficult

Conclusion

To the author's knowledge, this is the first case report presented on visceral OMT applied to the kidney in a runner. The related complaints about running from the patient could be related to the kidneys because of the impact of running, and the loss of weight that is associated with the sport. One OMT session seems to be necessary to treat the somatic dysfunction with a significant result.

Scanning for kidney dysfunction in a runner should be part of a complete osteopathic assessment.

- Does the runner experience pain only while running?
- Has the patient lost weight in a short amount of time?
- Is the patient properly hydrated?
- Assess the kidney, the psoas muscle, pelvic girdles 'as fascia and the diaphragm.
- Check the running technique (can be recorded on a video to identify technical corrections).
- Determine the VO_{2max}, maximal aerobic speed, running pace; it will help manage the cardiovascular intensity.
- Modify the training programs (frequency, mode (swimming, etc.), intensity, resting periods, environment, and duration of training).
- Establish realistic training goals.
- Consider a run/walk progression during the injury (6—12weeks) and include swimming or cycling trainings.
- Include core training, specific exercise, and suggest stretching to the routine.
- Make sure that the equipment is optimal: running shoes (neutral without all the unnecessary technology is a good option for most of the runners; be careful, minimalist shoes are not for everyone!).

It is hoped that this case report will encourage research on kidney somatic dysfunction in runners, and the methodology employed by Tozzi et al.[11] could serve as a useful starting point.

Conflict of interest

The author does not report conflict of interest and doesn't have any financial support.

Acknowledgements

The author would like to thank Kathy Duschene (photographer), who gave permission to publish the photographs. The author would also like to thank Sammy-Joe Roux for being the model in the photo shoot.

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