The results of computerised tomography injections for coccydynia

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THE RESULTS OF COMPUTERISED TOMOGRAPHY INJECTIONS FOR COCCYDYNIA

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INTRODUCTION

Coccydynia is a poorly understood painful condition which is disabling the patients while sitting and interfering with daily living activities. Coccydynia may be caused by a trauma or occur spontaneously.

Coccydynia is known as a disorder which has a tendency to convert into a chronic condition. Coccyx traumas may cause fractures and dislocations. Whilst some patients with acute coccydynia recover completely, others may face chronic coccydynia. There are many factors contributing to the ongoing pain such as body mass index, gender, occupation, pregnancy, postpartum period, the degree of instability of the coccyx segments and rarely tumours involving the coccyx. [1,2,3,4,5]

In this context, acute and chronic coccydynia may be treated individually by various treatment modalities. Most of the coccydynia patients are conservatively treated. The modalities currently used are intrarectal manual therapy, physiotherapy, ergonomic adaptations, blind and image guided steroid injections, image guided intradiscal injections and impar ganglion (ganglion Walther) blocade with local anesthetics or radiofrequency. Image guided injections are recommended to perform precise and safe injections for coccydynia. Fluoroscopy guided injections are more oftenly used and studied.[6,7,8,9,10] Although rare, there are also studies about injections with computerised tomography (CT) for coccydynia.[11,12] The new generation tomographies provides an oportunity to visualise the bone precisely and adjust the radiation level according to the segment claimed to be visualised. CT is commonly used as a guide for treatment of pain stemming from the cervical spine and the lumber spine.[13,14] To the author's knowledge there are no previous reports on the use of CT as an image-guidance for intradiscal coccyx injections.

PATIENTS AND METHODS

From April 2008 until January 2016, 853 patients with acute and chronic coccydynia were analysed retrospectively. All patients were consulted in a private clinic by the same physical medicine and rehabilitation specialist who was experienced in coccydynia. The diagnosis of coccydynia was based on the history of the complaint, exact localisation of pain and dynamic coccyx x-rays in the standing and sitting position and in some cases magnetic resonance imaging (MRI) of the coccyx.[15,16,17]All patients were assessed for other possible musculoskeletal disorders of the region, like pain of lumbosacral origin and disorders of pelvic structures. Patients were asked to show the exact place of pain confirmed with the presence of local tenderness by segmental palpation on the coccyx. Patients were firstly given one or more of the conventional treatment options such as donut cushions, rest, proper sitting advices, anti-inflammatory medication, analgesics, physiotherapy, intrarectal manual treatment and other injection treatments. CT guided injections were advised to patients who were unresponsive to the conventional treatment options or to patients who had reoccuring of symptoms after previously applied CT guided injections. Exclusion criteria for CT guided injections were; pregnant women, acute cases and fractures due to traumas within the first month, patients who do not want to have a CT guided injection, patients who have improved from conventional treatment options and children under 16 years. From 853 patients in total, 279 patients who had CT guided injections were enrolled into this study.

CT guided injections were technically performed mainly according to the findings from the standardised radiologic protocol of the dynamic x-rays of coccyx described by Jean Yves Maigne et al [15,3,16] The levels of coccyx to be injected was selected dependent on the type of the coccygeal deformity such as posterior dislocation, flexion hypermobility, spicule formation and anterior dislocation. The other remaning cases were classified as idiopathic. All patients had dynamic coccyx x-rays and the x-rays were evaluated by two doctors. Firstly by a radiologist then the clinician who asked the x-rays after the examination of the patients. Posterior dislocation was the sagital luxation of all or mobile part of the coccyx, hypermobility in flexion was flexion of the coccyx more than 25-30 degrees, spicule is the small bony excresence on the dorsal aspect of the tip of the coccyx.15 [Fig 1-3] show the deformities and the injections on the CT images. The remaning cases were called the idiopathic cases and pain was thought to be due to a chronic bursitis or an intradiscal infection.

Anterior dislocation was a very rare entity. The coccyx deformities were all recorded for each patient. Before the procedure, information about the injection was given and informed consent was taken from all patients. Patients were also informed that the minimum expected relief period is said to be at least 15 days after the injection.

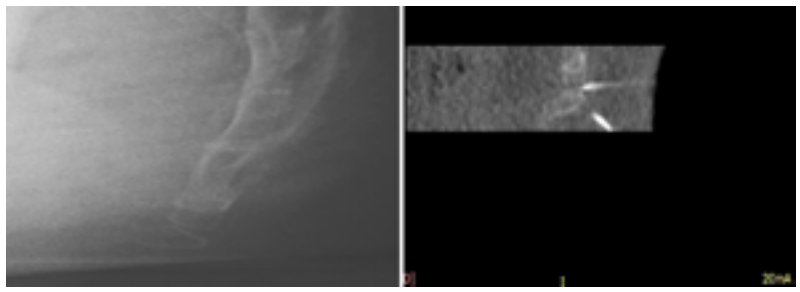

Figure 1

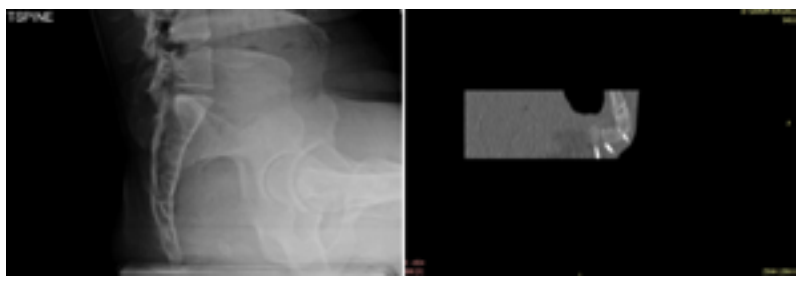

Figure 2

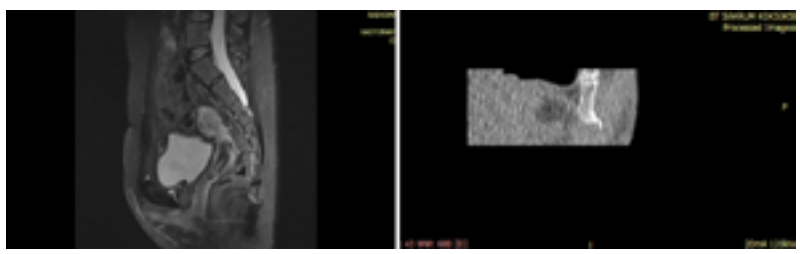

Figure 3

The CT machine used was GE Discovery CT750. (128 Slice Mode) To start the procedure; the exact place of the painful segment, x-ray and MRI findings were rechecked to select the area to be visualised. After sterile conditions for injection was provided, local intradermal anesthesia with a 13 mm 30 Gauge needle was performed on the segments to be injected. Then a 32mm 22 Gauge needle was placed on the segment selected. Following this, a lateral spine scout planning image, which is a screening for localisation of the needle was performed. [Fig 4] After visualising the needle, a localiser was set on the lateral scout planning image as narrow as possible just enough to visualise the coccygeal segment which was considered to be the source of pain.

Then the radiation level was adjusted. This was done by two parameters. Firstly milliampere dose was decreased until 10-15-20 milliamperes and secondly the voltage was adjusted to 120 kv and axial section thickness was selected between 1,25-2.5 mm. After the first shooting of 4-5 seconds, the needles were again adjusted to reach the target point utilising the measuring tool on the CT machine. Reformation of the images in 3 dimensions was used to be oriented. [Fig 5] Then the injectate was put on the target area. Dye was not needed because the needle, rectum wall, bowel gas and the injectate is clearly seen on the CT images. Every level or intradiscal space to be injected took a maximum of 5 minutes. So the procedure approximately lasted about 15-20 minutes.

For posterior dislocations, flexion hypermobility, anterior dislocations and intradiscal injections were performed, whereas for spicules, spicule targeted injections were performed. For idiopathic cocccydynia, for the 'rigid coccyx' the injection was targeted on the edema which was clearly seen on the MRI. Generally the tip of the coccyx was painful and was necessary to treat. Therefore this was added to the procedure. As a medication triamcinalone hexacetonide 40-60 mg or methylprednisolone asetate 40-80 mg and %1 lidocain mixture was injected on the targets. In cases who showed no improvement from intradiscal coccyx injections in the first 3 months (15 % of patients), impar ganglion blockade was applied by either sacrococcygeal, intracoccygeal or paracoccygeal approach depending on the anatomical structure and rectum safety. 8,10 This was easily achieved by the laser marking system of the CT. [Fig 6] Laser beam gave us the chance to identify the easiest and the most reliable access to reach the impar ganglion either by transcoccygeal or paracoccygeal approach.

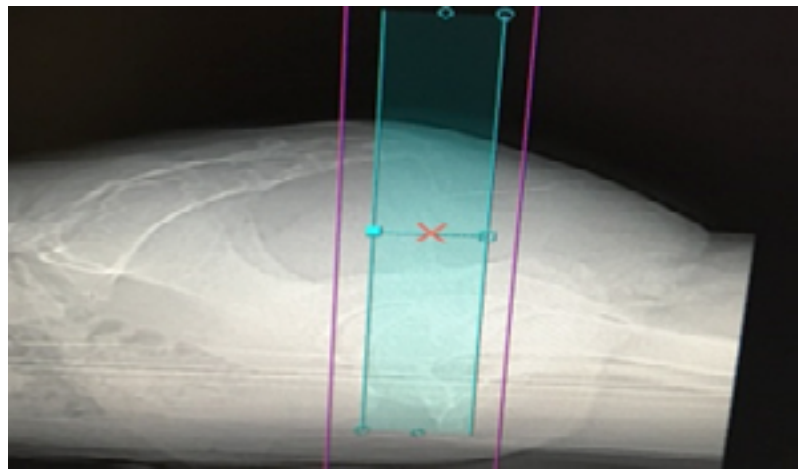

Figure 4

Figure 5

Figure 6

15 minutes before this procedure, patients were asked to discharge their rectum with a rectal enema. This was to avoid the distention of the bowel segment which is neighbouring the coccyx, allowing the physician to work in a more comfortable zone. In this study a spinal needle (75mm, 22 Gauge) was used. For 3 patients the technique described by Patrick Foye was used.8 The tip of the needle was bent to reach the ganglion in 3 discrete steps with rotating the needle. When the CT images confirm that the needle was in the correct location, the 10 ml injectate of bupivacine % 0,5 and triamcinalone hexacetonide 40mg and lidocain %1 was administred on the target. [Fig 7] Radiofrequency for impar ganglion blockade was also used for certain patients with intractable coccydynia. However they were a smaller number compared to the blockades with local anesthesics.

At the end of the procedure the radiation dose reports were automatically taken and were recorded in the files of all patients. [Fig 8]

Patients were allowed to leave the hospital 30 minutes after the injection. They were advised to sit on a donut for a month. All patients were called for a follow up visit 1 month after the injection.

For pain intensity measure, VAS score was recorded at specific periods. Pre-treatment, one month and 12-18 months after the injection VAS scores were noted via phone calls and visits. 6/10 or more decrease of VAS score was considered as total relief whereas 3-4/10 of VAS score decrease was considered as partial relief.

Figure 7

Figure 8

RESULTS AND STATISTICAL ANALYSIS

During this study period, 279 patients with acute and chronic coccydynia were treated out of 853 patients. %32.7 of the referred patients had CT guided intradiscal injections, spicule targeted injections or impar ganglion blockade for different coccyx deformities.

The mean age of patients was 40,6 ±12 (range 20-75)

There were 198 female and 81 male patients. Therefore 41 % of patients were male and 59% of patients were female.

70 patients (25%) were acute cases and 209 patients (65%) were chronic cases. (acute was considered as coccydynia less than 6 months)

An average of 1,8 injections per patient was performed.

Ganglion impar blockade was applied to 42 patients. (15%)

In this study group the classificcation of the coccyx deformity showed 26 %posterior dislocation, 25% flexion hypermobility, 23 % idiopathic coccydynia, 20 %spicule, 1% anterior dislocation. [Fig 9]

Mean pre-procedure pain score of VAS is 8,6. Mean post procedure VAS score after 1 month is 3,1 in %85 of the patients who had total or partial benefit from the treatment. 15% of patients did not improve with the injection treatment. 12-18 months after the procedure mean VAS score was 3,4 in 63% of the patients and 8 in 22% of the patients who mentioned about the need for a second injection.[Fig 10]

No complications were recorded. There was only localised, transient pain in 20% of patients in the first week of the treatment. There was no infection case related to the procedure.

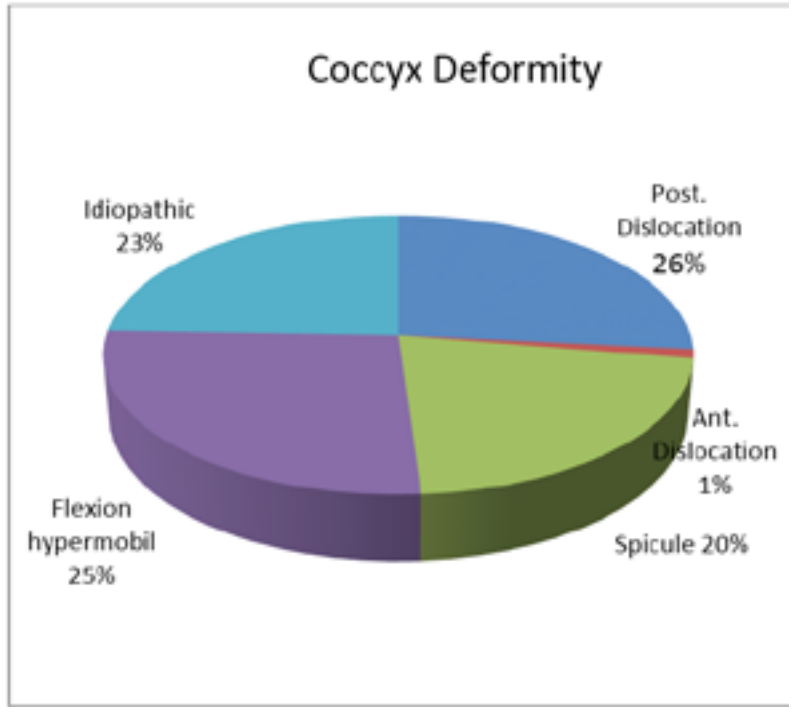

Figure 9

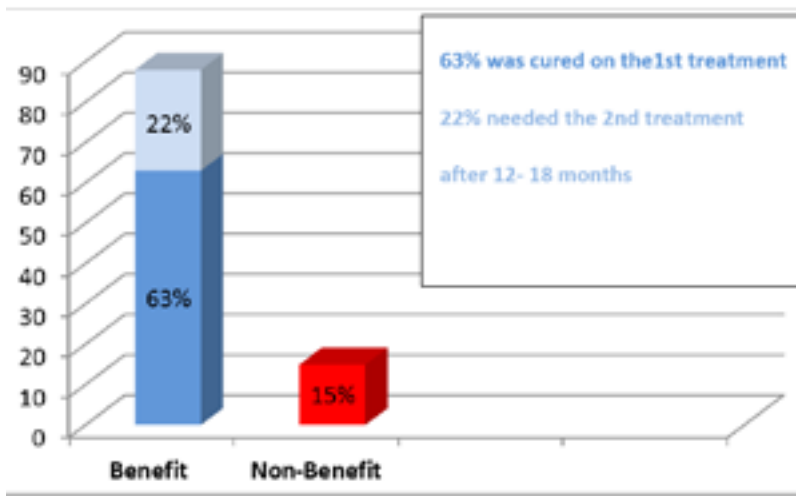

Figure 10

DISCUSSION

Coccydynia which means coccyx pain, in fact, is the name of a symptom. For decades, due its chronic nature, this symptom was considered as 'difficult' to treat and to have relation with psychosomatic factors.18 The biomechanic etiology of coccydynia is understood better after the advanced studies of the anatomy of the sacrococcygeal joint and the intercoccygeal discs.19 It was a substantial contribution of Jean Yves Maigne to coccydynia and to musculoskeletal medicine to discover the dynamic x-rays of coccyx.16 These x-rays showed dislocations of coccyx segments in the sitting position which were not identified before, helping thousands of patients and physicians in understanding the reason of coccydynia. Then coccyx pain has started to be accepted as a mechanical and 'real' disorder. Following this, in 1990's intradiscal coccyx injections with imaging guidance has brought out evidence for treatment of coccydynia.

Lirette et al. stated that coccydynia is a condition which is often self limited and mild. Conservative treatment is successful in 90 % of cases.2 In our study group 574 out of 853 patients had conservative treatment meaning approximately 67 % of patients did not need a CT guided injection. The reason of the lower number compared to Lirette's study may be due to the fact that the patients are referred to our clinic after seeing another physician, being used anti-inflamatory medication and already taken precautions like proper sitting and using donuts or specially designed pillows for coccdynia.

However for the rest of the patients (33% in our study) with ongoing pain, injections might be necessary. Mitra et al. have shown that acute pain (less than 6 months) is more likely to respond to fluoroscopically guided coccygeal steroid injections.[7] In our patient group acute cases are 25% of the total cases. It is also experienced in our clinic that acute cases were good responders to injection treatments.

Liretteetal.alsoemphasizedthatimagingguidance (ultrasound or fluoroscopy) is recommended for injections around the coccyx because of its position relative to other structures especially to rectum.[2] Fluoroscopy guided injections for coccydynia are being published since many years but there is a paucity of number of studies for CT guided injections. Datir et al. have used CT as a guidance to block the impar ganglion to treat coccydynia. 8 patients were treated with a total of 11 injections. Ganglion impar was visualised with contrast material before the blockade. At the end of 6 months 75% of patients had symptomatic relief. Agarwal-Kozlowski et al. used CT as a guide to block the impar ganglion for perineal pain due to different pathologic conditions such as carcinoma of prostate, colorectal carcinom, post-herpetic neuralgia and found out results with a significant reduction of pain scores and no hazards.[20]

The advantages of CT guided injections are accurate and confident needle placement in the sacrococcygeal region, ability to see the soft tissues around the coccyx, decreased risk of penetrating to the rectum to reach the ganglion impar, seeing the anatomical variations and the ability to adjust and decrease the dose of radiation the patient is exposed.

Despite the fact that CT is thought as a source of high radiation for a pain procedure, the new generation CT's give us the opportunity to decrese the level of radiation.13 DLP (dose length product) was taken as the radiation unit in this study and it was seen that for an intradiscal injection total exam DLP was 15, for an impar ganglion blockade it was 26 . For an abdominal CT, in [Fig 11] , total DLP was 869. For injections of coccydynia the radiaton level was 20% of the abdominal tomography and image quality was fairly enough for the procedure. Saeed et al. showed that a radiation dose reduction of 25% was achieved in 4 different CT scanners without significantly affecting the 3 image quality parameters.[21]

In this context, fluoroscopic injections and ct guided injections for coccydynia may be compared in another study for effectiveness and the amount of radiation the patients and the physicians are exposed.

In this study group 15% of 279 patients had impar ganglion blockade when they did not respond to the injections after 3 months. This treatment was started after June 2014. That was the reason of the lower percentage of the impar ganglion blockade. The aim was to block nociceptive and sympathetic fibres causing chronic coccydynia. For the patients who had impar ganglion blockade, also painful tip of the coccyx was injected. This was especially important for idiopathic subgroup of coccydynia patients who had edema on the MRI.

Studies show that localisation of the impar ganglion may change individually. Impar ganglion is known to be generally located on the anterior aspect of sacrococcygeal joint or between Coccyx 1-2.8 Its location can be better visualised by CT.11 Ultrasonography can also be used. Gupta et al. used USG to perform the ganglion impar neurolysis.[22] Different approaches to reach the impar ganglion sacrococcygeal or C1-2 can be chosen. Foye has described paracocygeal corkscrew method alongside the coccyx.8 This method was used in 3 patients in this study.

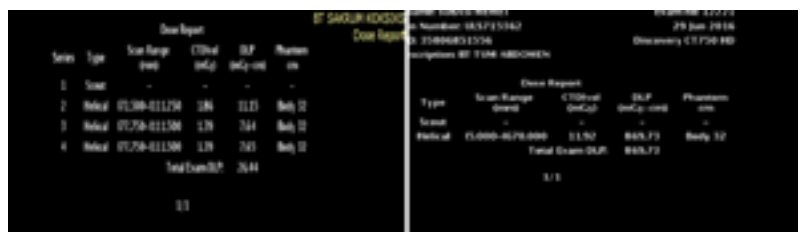

Figure 11

CT guided injections for coccydynia is a short lasting treatment (15-20 minutes) Patient sedation is not needed. In our group of patients, there were no complications other than localised pain in 20%of patients in the area of injection in the first week of the treatment which responded to analgesics. There was no infection case related to the procedure. As in **Figure 12** the injectate could be easily seen on the CT images and act as a contrast material.

There was total or partial pain relief in 85% of the patients. Even though there were the ones who were totally pain free, there were also the ones with mild pain after long sitting periods. The ones who needed a second injection in 12-18 month period (22%) were the ones with VAS scores over 7. When this group was asked for a second injection, they all agreed to have it.

Generally speaking, after the injection treatment it is substantial to give advices about proper sitting positions for coccyx, low back, posture, sitting time limitation, type of sports they can perform, gluteus maximus exercises, heat applications in appropriate cases, driving and warn the patient about the repeating of the symptoms if these measures are not taken.

Despite the fact that coccygectomy was known to exist with a high complication rate, the studies in recent years are giving more hopeful data.23,24 Doursinian had 79% of success with the operation of coccygeal spicules in 33 patients.

Psycogenic etiology was very rare in our group of patients whereas previously coccydynia was considered a psychosomatic pain. However it seems essential to understand these patients about their chronic pain. There are limited number of health care providers giving treatment about coccydynia. Therefore patients need doctors' understanding about their chronic and late diagnosed pain. Antidepressants are sometimes necessary to provide additional benefits for certain chronic patients especially patients who do not improve with surgery. Also for patients unresponsive to coccygectomy steroid injections can be applied for the bursitis on the remaining bone.

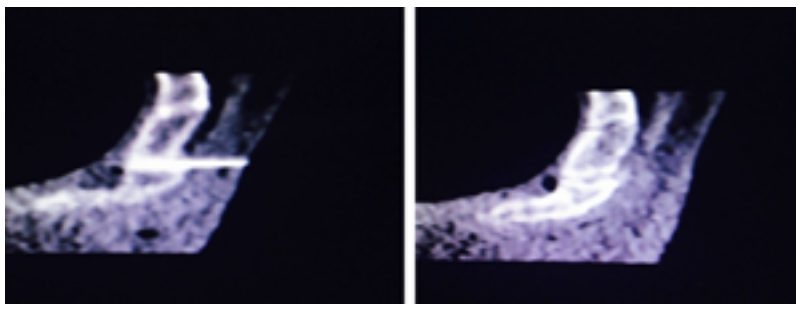

Figure 12

CONCLUSION

Coccydynia is a pain syndrome which can be due to a wide range of factors. Therefore the treatment should start from the most practical one and advance to the most complex. Injections with image guidance are effective treatments that should be tried before surgery. CT guided injection for coccydynia is an effective and also safe treatment option which has been more practical to perform with the improvement of imaging technology.

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