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## Coccydynia in postpartum women: A retrospective study of final results of extracorporeal shock wave treatment

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### Abstract

**Introduction:** Postpartum coccydynia is pain that appears as soon as a sitting position is adopted after delivery. Coccyx morphology, body mass index, vaginal delivery, instrumental delivery, multiparity, female sex, mature age and short perineum in women with difficult delivery are risk factors. Coccydynia is pain around the coccygeal region, which is caused by sudden impact over the coccyx area from falling from height or traumatic injuries, prolonged sitting for a long time in a narrow space, leaning back while in a seated position leads to increased pressure on the coccyx, vaginal birth delivery etc. which results in pain and inflammatory changes around the surrounding ligaments and muscles. Most patients prefer the conservative treatment with non-invasive methods for coccydynia. In recent years (ESWT) is suggestive for the non-invasive treatment of many musculoskeletal conditions, including plantar fasciitis, epicondylitis and shoulder calcification and coccydynia.

**Aim and objectives:** The purpose of the study is to evaluate the effects of ESWT on the outcomes of Coccydynia in postpartum women.

**Materials and methods:** This study had a retrospective design from January 2018 to December 2021. The clinical data of 22 patients treated with ESWT were analysed and followed up at regular intervals of 1 month, 3 months, 6 months. All the patients were referred from department of obstetrics & gynaecology or an obstetrics & gynaecology consultant to Orthocare, Vijayawada and department of orthopaedics, NRI general hospital, Chinnakakani. We have given three sessions per week, preferably on the alternative days. The number of sessions per patient varies from 6–10. Visual analog scale (VAS) scores were noted at the initial consultation, at each session, and during the initial and final follow-up (at 6 months) examinations after the treatment. The 36-item short-form (SF-36) quality of life scale survey was conducted at the beginning and end of the treatment.

**Results:** The mean VAS score was 9.6 (9–10) before the treatment and 3.4 (0–2) after the treatment ( $p < 0.05$ ). The VAS score decreased to  $\leq 3$  in 79.4% of patients. Compared with the preoperative SF-36 scores for physiological function, mental health, and social function, the postoperative scores were significantly improved.

**Conclusion:** ESWT is a cost-effective treatment method with low rates of complications especially in breast feeding mothers where anti-inflammatory analgesics are not a good choice to control the pain. In our study, ESWT provided effective pain control for chronic coccydynia. At least four sessions are needed to achieve a successful outcome.

**Keywords:** Coccydynia; ESWT; Postpartum Women; Extracorporeal Shock Wave

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## 1. Introduction

Postpartum coccydynia is pain that appears as soon as a sitting position is adopted after delivery. Coccyx morphology, body mass index, vaginal delivery, instrumental delivery, multiparity, female sex, mature age and short perineum in women with difficult delivery are risk factors. Coccydynia is pain around the coccygeal region, which is caused by sudden impact over the coccyx area from falling from height or traumatic injuries, prolonged sitting for a long time in a narrow space, leaning back while in a seated position leads to increased pressure on the coccyx, vaginal birth delivery etc... resulting in pain and inflammatory changes around the surrounding ligaments and muscles [1]. Coccydynia is associated with coccygeal instability or subluxation, and patients develop further increase in coccydynia [2]. Postacchini introduces the radiographic orientations of the coccyx and Massobrio [3], observed that patients with coccydynia showed more mobility over first intercoccygeal joint. The pain drawings are used to identify the correct symptoms of coccydynia and offer valuable methods for relieving the symptoms of coccydynia.

Patients with coccydynia often complains of pain and local tenderness around the coccyx [4]. Surgical interventions such as excision of the mobile coccyx or a total coccygectomy relieve approximately 80% to 90% of symptoms [5]. The most common complications of a coccygectomy is wound infection; therefore, surgery is rarely performed, and thus, the nonsurgical strategies remain the major treatment for coccydynia. Management typically includes medications such as gentle massage over sacrococcygeal joint, nonsteroidal anti-inflammatory agents (NSAIDs), manual manipulation for malalignment of the coccyx [7,8], physical therapy with interferential current (IFC)[10] or shortwave diathermy (SWD)[11] and local steroid injections combined with anesthesia [9]. Shortwave diathermy (SWD) is used to provide heat to the deep tissues [12] and helps in relieving pain and muscle spasms in inflammatory tissue [13]. SWD is regarded as an effective treatment for chronic osteoarthritis [14] and is used for the somatic pain generated by the ligamentous and muscular elements inserted into the coccyx [15]. SWD can be effective for the treatment of patients with chronic low back pain [16] and was reported to reduce pain in patients with coccydynia [17]. IFC has reported to reduce inflammation-induced central sensitization [18] and reduce low back pain [19,20]. Combined with other physical modalities, IFC showed better outcomes in reducing the pain intensity associated with musculoskeletal disorders [10].

In recent years (ESWT) is suggestive for the non-invasive treatment of many musculoskeletal conditions, including plantar fasciitis, epicondylitis and shoulder calcification. The pain relief with ESWT might be due to the stimulation analgesia [24] and increased regeneration of tissue [25]. However, the effects of ESWT on low back ache and coccydynia are discussed less till now. Lee et al. reported exercise program which is combined with ESWT, relieved chronic low back ache with conservative physical therapy [26]. There is only one recent report by Marwan et al., presenting 2 cases of coccydynia, and he reported three sessions of ESWT effective in relieving pain; the pain did not recur during one year of follow-up period [27]. Most patients prefer the conservative treatment with non-invasive methods for coccydynia, including physical modalities and ESWT. Few studies are comparing the effects between ESWT and SWD combined with the IFC therapy in patients with coccydynia.

### *Aim and objectives*

To find out how useful is ESWT in relieving the pain of coccydynia and to evaluate its efficacy and to analyse the outcomes in Coccydynia in postpartum women.

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## 2. Material and methods

### 2.1. Patients

The study was a retrospective design, done at Orthocare, Vijayawada and Nri General Hospital, Chinnakakani by analysing the clinical data of 22 patients treated with ESWT from January 2018 to December 2021.

### 2.2. Inclusion criteria

- Postpartum women
- Patients who have given written informed consent.
- Age group:20-35 years

### 2.3. Exclusion criteria

Patients with cardiac pacemaker, tumors of the cauda equina, pelvic surgery, herniation of the lumbosacral disc, internal proclivita, genitourinary or gastrointestinal complaints or psychogenic factors were excluded.

The patients’ histories were taken, and they underwent physical examination to identify the tender area and bony position. Roentgenography was used to assess the coccyx position and rule out major coccyx dislocations.

A total of 22 Patients were included in the study. Number of sessions varied between 6 -10. We have given 3 sessions per week, preferably on the alternative days. For maximum of 3 weeks we did finish our study on each patient, except in two patients who had to go for the 10<sup>th</sup> session. Follow up was done at 1month, 3months and 6 months.

Patients in this study were asked to do pelvic floor strengthening exercises for 6 months

**Table 1** Age distribution and duration of pain

Age	Years
Minimum-maximum	20-35
Median	27.5
Pain duration	Months
Minimum-maximum	3-10 Months
Median	6.5

### 2.4. Evaluation

Before treatment, all of the patients reported the pain intensity, using a visual analog scale (VAS), on a scale from 0 through 10 (0 for no pain and 10 for the worst pain) [28].

Physical and Social Function before and after the treatment was also evaluated.

### 2.5. Intervention

The patients were asked to discontinue analgesics for one week prior to and after the treatment. The patients were maintained in the prone and knees separated position with a pillow under the abdominal area. The patients received 2500 shots of ESWT in the coccyx area per session and 3 sessions per week were given. The frequency used was 5 Hz and the pressure was 3–4 bar.



**Figure 1** ESWT Machine displaying the settings for different body regions

### 3. Results

Each Patient had received 3 sessions Per week for almost 3 months duration, and then followed up at 1,3,6months. Results were mainly based on Pain assessment score VAS, and Physical function score before and after the treatment and Social Function score before and after the treatment.

**Table 2** VAS Score before and after treatment with ESWT

Vas score	
Initial presentation	6.2 ± 5
4 <sup>th</sup> Week	3.2 ± 5
6 <sup>th</sup> Week	2.2 ± 5
12 <sup>th</sup> Week	2.0 ± 5
24 <sup>th</sup> Week	1.0 ± 5

The VAS score decreased by 3.5, 4.0, 4.2 & 5.0 in the ESWT group at the 4<sup>th</sup>, 6<sup>th</sup> and 12<sup>th</sup> & 24<sup>th</sup> week post-treatment evaluations, respectively ( $p < 0.001$ ).

12 cases had Pain relief with 8 sessions, 08 cases had pain relief with 06 sessions and 02 cases had pain relief with 10 sessions. All the patients had significant improvement VAS score and pain didn't re-occur until latest follow-up.

**Table 3** Number of sessions required for significant pain relief

Cases	Sessions
12	8
8	6
2	10

**Table 4** Social functioning of patients before and after treatment with ESWT

Social functioning (SF)	Min - Max	Median	Mean ± SD
Before treatment	0.0 to 100	50.0	44 ± 29.2
After treatment	12.5 to 100	75.0	73.5 ± 21.7

#### 4. Discussion

The mechanism underlying pain relief after ESWT is not clearly understood, and many theories have formulated on such. One theory regarding the efficacy of ESWT in tendinopathy is that it promotes increased tissue regeneration through the induction of mechano-transduction on the cytoskeleton and the stimulation of protein synthesis [20]. ESWT facilitates tendon repair through upregulating extracellular matrix biosynthesis and increasing the expression of TGFβ1 and IGF-I. ESWT also decreases the levels of inflammatory mediators (interleukins and matrix metalloproteinases) and promotes vascularization of the injured tendon junction to promote tissue healing. ESWT has an effect on pain transmission by acting on substance P. ESWT can support neovascularization by increasing the expression of factors including vascular endothelial growth factor, endothelial nitric oxide synthase, and proliferating cell nuclear antigen [21-25].

ESWT previously suggested as an effective modality in relieving pain in the early phases of refractory chronic coccydynia. Marwan et al. [15] inducted the first study to investigate the efficacy of ESWT in treating coccydynia and included only 2 patients. They performed ESWT in 2 patients with coccydynia and found that it was effective in relieving the pain caused by this disorder. In their study, ESWT performed once a week for 3 weeks at 3,000 shock waves of 0.2 mJ/mm<sup>2</sup> per session directed to the maximal point of tenderness. Pain relief achieved, and the pain did not recur within the 1-year follow-up period. In our study, no relapse of pain observed at the sixth-month follow-up session. There was no significant difference in the VAS score between the first and sixth month follow-up sessions. We postulate that the pain intensity increased in these patients owing to the induction of inflammation by ESWT. The induction of inflammation as a mechanism attributed to the effect of ESWT [26].

Another study performed in 23 patients with coccydynia followed up for 6 months after ESWT reported that ESWT had provided partial relief of pain and disability (is deliberately focused on physical activities and not the psychological consequences of acute or chronic pain) in the majority of the patients [21]. Used the numerical pain scale and Oswestry disability index to evaluate the clinical outcome. In our study, we used the sf-36 survey, which is widely used for quality of life assessment. The energy/fatigue and emotional well-being scores did not change significantly after the treatment. Emotional state and feeling of fatigue are parameters that can change daily and be affected by environmental factors. In general, the physical therapy has a placebo effect and creates a pseudo-state of well-being and dependency in patients. As such, we postulate that ESWT does not yield major changes in emotional state and does not cause a false healing effect in patients. Conversely, we found significant differences in the other seven parameters of the sf-36 survey. We also observed significant improvements in the functional parameters of the patients.

In a different study including 10 patients with chronic coccydynia, four sessions of ESWT were performed 1 week apart (3,000 shock waves per session of 2-bar pressure and 21-hz frequency using a radial probe). The VAS score assessed at the first, second, third, and fourth weeks after the initiation of the treatment and at 1 and 6 months after the last ESWT session. A significant decrease in the VAS score at 4 weeks ( $p = 0.007$ ) and 2 months ( $p = 0.007$ ) was observed; however, no significant decrease was detected at 7 months after the last ESWT session when compared with the baseline ( $p = 0.011$ ) [6]. In our study, we applied a minimum of four and a maximum of 10 sessions of ESWT until the VAS score decreased to  $\leq 3$ . Obtained the desired VAS score in 17 patients, seventy-nine percent of the patients had successful results. There was no change in the VAS scores in 5 patients; these patients exhibited periodic well-being during the 10 sessions. However, their VAS scores still did not decrease to  $\leq 3$ . We observed that recovery was still in progress at the follow-up session (at 6 months;  $p = 0.0001$ ).

ESWT has been useful in chronic coccydynia as it increases blood circulation and tissue regeneration. The ESWT should be adjusted according to the dose and duration required by the individual [27]. In previous studies, ESWT generally performed in three or four sessions. The pain relief started after the fourth session in our study. Therefore, we recommend more ESWT sessions for patients with chronic coccydynia. We consider that this result is important and must be considered while establishing a standard protocol for ESWT.

Maier et al. [28] evaluated MRI results before and after ESWT in the calcaneus and suggested bone marrow edema as an important determinant in the follow-up after ESWT. In our study, we followed a similar method to classify bone marrow edema according to the signal intensity increase. We did not observe any worsening of bone marrow edema in any patients. Severe regression (decrease of signal intensity) of bone marrow edema observed in only 2 patients; however, there was no significant difference. Based on our results, ESWT does not worsen bone marrow edema. Thus, bone marrow edema shown on MRI may not be associated with the exact therapeutic effect of ESWT.

### *Limitations*

Our study has some limitations, including its retrospective, non-blinded, and non-randomized design. The study population is limited because of the low incidence of the disorder & confined to postpartum women. Bone marrow and soft-tissue edemas, diagnosed based on hyperintense signals on the short tau inversion recovery images. No repeatability study was undertaken for scoring the images. Longer follow-ups are required to determine the long-term results.

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## **5. Conclusion**

ESWT is a cost-effective treatment method with low rates of complications [9] especially in breast feeding mothers where usually we don't give any anti-inflammatory analgesics. In our study, ESWT provided effective pain control for chronic coccydynia. To evaluate the efficacy of ESWT more accurately and sensitively, prospective randomized studies with longer follow-up periods are needed; these studies must compare the efficacy of ESWT at different energy doses with those of other treatment methods. Each patient's response to the treatment may be different at the different stages of the treatment. In addition, an increase in pain intensity may be observed owing to inflammation at the beginning of the treatment. Therefore, in such cases, the treatment should not be terminated, concluding that ESWT is not effective. More sessions may be needed to observe the effect of ESWT. Based on our results, we should apply at least four sessions to achieve a successful outcome.

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## Compliance with ethical standards

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### *Disclosure of conflict of interest*

No conflict of interest.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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