Case Report
Sacral Rheumatoid Nodule: An Unusual Indication for Coccygectomy

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Here, we present a case report of a woman who presented with a large sacral rheumatoid nodule. This patient failed conservative treatment and presented in search of a surgical solution. We successfully removed her rheumatoid nodule using a surgical approach typically reserved for traumatic coccydynia. We show how coccygectomy, although a rare surgical procedure, was effective in treatment of a large rheumatoid nodule.

1. Introduction
Rheumatoid arthritis is a chronic inflammatory disease that is predominately characterized by a variety of extra-articular manifestations. The development of disease-modifying antirheumatic drugs (DMARDs) has altered the treatment paradigm of rheumatoid arthritis; however, extra-articular rheumatoid nodules (RN) may become refractory to DMARD treatment. In such cases, RNs may progress to severe joint destruction and prevent individuals from attaining an active lifestyle. Synovectomy and nodule resection have been previously described for treatment refractory RNs in most joints. However, due to the rarity of sacral RNs, no previous cases have been reported describing surgical options for severe refractory cases. Here, we present a case of a woman with a large sacral rheumatoid nodule that caused discomfort and was resistant to conservative treatment. We present our surgical approach to removal of this nodule as well as a brief description of the surgical procedure and a review of its use for paracoccygeal masses.

2. Case Presentation
A 77-year-old woman with a history of rheumatoid arthritis with numerous nodules and a previous C1-C2 posterior fixation and fusion for atlantoaxial instability presented for evaluation with a ten-year history of a painful mass in the region between her lower back and intergluteal cleft. The mass had been intermittently drained by another physician for some time with recurrence and persistent symptoms. Computerized tomography and magnetic resonance imaging were performed which demonstrated a large, multilobulated cystic nodule in the region of the sacrococcygeal joint (Figure 1). The patient had failed the conservative treatment of intermittent drainage, and throughout the years, the need for drainage had become more frequent, with her requiring drainage of the cyst every month. With each subsequent drainage, only a small amount of fluid was able to be drained, and the patient presented to our clinic with significant pain and inquiring about a surgical solution.

After evaluation, the patient underwent surgery for removal of the lesion. A posterior sacrococcygeal approach...
was utilized for en bloc resection of the cystic nodule and coccyx (Figure 2). Plastic surgery assistance was utilized for reconstruction of the pelvic floor muscles and mobilization of the gluteus muscles and fasciocutaneous flaps. Pathology demonstrated a benign cyst with giant cells, acute and chronic inflammation, and prominent fibrosis, consistent with a rheumatoid nodule.

The patient was not able to follow up in our clinic due to transportation issues. However, in a telephone follow-up one year post surgery, she reported doing well without recurrence of the painful sacral nodule.

3. Discussion

Also called necrobiotic nodules, RNs are a common complication of rheumatoid arthritis and effect between 30-40% of patients [1, 2]. Risk factors for developing RN in patients with rheumatoid arthritis include male sex, younger age at disease onset, longer duration of disease, mononuclear phagocyte- (MPH-) activated immune complexes, high circulating levels of Th1 cytokine and macrophage pro-fibrosis, and seropositivity for rheumatoid factor [2–6]. Most commonly found near areas of subcutaneous pressure points, the pathogenesis of RN formation is thought to be related to damage of nearby microvasculature due to repetitive injury or chronic inflammation [1, 5, 6]. Treatment of RNs usually consists of conservative management, and drainage is not recommended due to a high risk of recurrence and infection [5]. While little is known regarding treatment for coccydynia secondary to sacral RN, surgical removal of RNs in general may be necessary in cases of debilitating symptoms, nerve root compression, ulceration, or infection [5].

Coccydynia secondary to sacral RN is a rare entity with only four case reports previously described in the literature [3, 7]. Of these, 2 cases reported effective treatment following continued treatment for systemic rheumatoid arthritis, one
Table 1: Case reports of patients treated for sacral nodules or other forms of nonidiopathic coccydynia.

<table>
<thead>
<tr>
<th>Author/year</th>
<th>Age/sex</th>
<th>Symptom duration</th>
<th>Indication</th>
<th>Treatment</th>
<th>Prior treatment</th>
<th>Complication</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sturrock, 1975</td>
<td>67/F</td>
<td>30 years</td>
<td>Nodular rheumatoid arthritis</td>
<td>Skin grafting</td>
<td>Topical antibiotics</td>
<td>None</td>
<td>Good, no recurrence</td>
</tr>
<tr>
<td>Sturrock, 1975</td>
<td>78/M</td>
<td>8 months</td>
<td>Nodular rheumatoid arthritis</td>
<td>Nodule resection</td>
<td>Conservative</td>
<td>Sacral ulcer, bronchopneumonia</td>
<td>Deceased, with local recurrence</td>
</tr>
<tr>
<td>Sturrock, 1975</td>
<td>68/F</td>
<td>5 years</td>
<td>Nodular rheumatoid arthritis</td>
<td>Prednisolone</td>
<td>Conservative</td>
<td>None</td>
<td>Good, no recurrence</td>
</tr>
<tr>
<td>Krasin, 2001</td>
<td>40/F</td>
<td>4 years</td>
<td>Carcinoid tumor</td>
<td>Coccygectomy</td>
<td>Chemotherapy</td>
<td>None</td>
<td>Good, no recurrence</td>
</tr>
<tr>
<td>Tulchinsky, 2005</td>
<td>44/F</td>
<td>7 years</td>
<td>Paracoccygeal teratoma</td>
<td>Coccygectomy</td>
<td>Antibiotics</td>
<td>Minor wound infection</td>
<td>Good, no recurrence</td>
</tr>
<tr>
<td>Gavrilidis, 2013</td>
<td>73/M</td>
<td>4 months</td>
<td>Sacrococcygeal chordoma</td>
<td>Coccygectomy</td>
<td>Conservative</td>
<td>None</td>
<td>Good, no recurrence</td>
</tr>
<tr>
<td>Kye, 2011</td>
<td>66/F</td>
<td>Epithelial cyst</td>
<td>Coccygectomy</td>
<td>Conservative</td>
<td>None</td>
<td>Good, no recurrence</td>
<td></td>
</tr>
<tr>
<td>Kye, 2011</td>
<td>24/F</td>
<td>Mature teratoma</td>
<td>Coccygectomy</td>
<td>Conservative</td>
<td>None</td>
<td>Good, no recurrence</td>
<td></td>
</tr>
<tr>
<td>Kye, 2011</td>
<td>53/F</td>
<td>Mature teratoma</td>
<td>Coccygectomy</td>
<td>Conservative</td>
<td>None</td>
<td>Good, no recurrence</td>
<td></td>
</tr>
<tr>
<td>Stewart, 2011</td>
<td>65/F</td>
<td>Rectal carcinoma metastasis</td>
<td>Coccygectomy</td>
<td>Conservative</td>
<td>None</td>
<td>Good, no recurrence</td>
<td></td>
</tr>
<tr>
<td>Goncalves, 2014</td>
<td>29/F</td>
<td>6 months</td>
<td>Sacral giant cell tumor</td>
<td>Coccygectomy</td>
<td>Conservative</td>
<td>None</td>
<td>Good, no recurrence</td>
</tr>
<tr>
<td>Kato, 2016</td>
<td>65/F</td>
<td>2 weeks</td>
<td>Nodular rheumatoid arthritis</td>
<td>Etanercept, prednisolone, methotrexate</td>
<td>Conservative</td>
<td>None</td>
<td>Good, no recurrence</td>
</tr>
<tr>
<td>Diaz-Aguilar, 2017</td>
<td>23/F</td>
<td>Mature sacral teratoma</td>
<td>Coccygectomy</td>
<td>Conservative</td>
<td>None</td>
<td>Good, no recurrence</td>
<td></td>
</tr>
<tr>
<td>Gaikje, 2017</td>
<td>20/M</td>
<td>2 years</td>
<td>Benign dermoid cyst</td>
<td>Coccygectomy</td>
<td>Conservative</td>
<td>None</td>
<td>Good, no recurrence</td>
</tr>
<tr>
<td>Ngwenya, 2020</td>
<td>77/F</td>
<td>3 years</td>
<td>Nodular rheumatoid arthritis</td>
<td>Coccygectomy</td>
<td>Antibiotics, cyst drainage</td>
<td>None</td>
<td>Good, no recurrence</td>
</tr>
</tbody>
</table>
case reported effective treatment following resection of the sacral nodule, and one case reported a patient who developed a recurrence of their sacral RN following nodule resection. This patient was treated aggressively with antibiotics and wound debridement; however, she unfortunately died after developing subsequent bronchopneumonia [3]. While no studies have been described detailing resection of sacral RNs, resection of RNs in other areas has been found to have a high rate of recurrence. Two retrospective cohorts of patients undergoing synovectomy for elbow RNs found that over half of patients developed recurrence of the RN within 5 years [8, 9]. The patient reported here also experienced multiple local RN recurrences after sacral nodule removal; however, she has retained good local control following coccygectomy. As RN is an extra-articular manifestation of an intra-articular process, it is understandable that removal of RNs often results in immediate postoperative relief with delayed local recurrence. It is feasible that the removal of the nodule and the affected joint helped the patient described here be recurrence-free as this treatment option attempted to remove the intra-articular contribution to her extra-articular disease process.

Described in 1972, the Gardner method for coccygectomy is often employed and has been associated with good results. From the posterior approach, the patient is placed in the jack-knife position. A 7.5 cm cut is made from above the sacrococcygeal joint down the lien of the buttocks. After cutting through to the coccyx, the tip of the coccyx is raised and the tip of the coccyx is cut away from the tissue around the anus. Using a wet sponge, the rest of the coccyx is separated from the tissues underneath it all the way to the sacro-coccygeal joint, and the sacrococcygeal joint is transected [6]. Minor deviations to this technique have been reported. For example, Patsouras et al. utilize preoperative bowel preparation with 5 days of a minimal residue diet, an incision to the edge of the anal sphincters at 6 o’clock, and transanal digital examination to confirm the posterior rectal wall [10].

Though coccygectomy has traditionally been utilized for management of traumatic coccydynia refractory to conservative measures, this technique has been reported as useful in the treatment of paracoccygeal masses. Nonidiopathic causes of coccydynia are rare, and including the patient reported here, we found 10 case reports in the literature describing coccygectomy for nonidiopathic coccydynia. The age of 8 females and 2 male patients ranged from 20 to 77 years (mean 51.1 ± 20.6). Diagnoses included carcinoid tumor [11], paracoccygeal teratoma [12, 13], epithelial cyst [14], mature teratoma [15], sacrococcygeal chordoma [16], sacral giant cell tumor [17], rectal carcinoma metastasis [18], and benign dermoid cyst [19]. Coccygectomy was the first-line therapy in 8 patients following failure of conservative management or was performed after failure of antibiotics or chemotherapy (Table 1). All patients were described to have good outcomes without signs of recurrence at the most recent follow-up.

**Data Availability**

Additional details of the case report are available from the corresponding author upon request. The data supporting the review of the literature are from previously reported studies, which have been cited.

**Conflicts of Interest**

The authors have no conflicts of interest.

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**References**


