

# Sacrococcygeal Teratoma in an Adult: A Case Report and Systematic Review of the Literature

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**Abstract:** Sacrococcygeal teratomas are germ cell tumors derived from pluripotent cells and are rarely diagnosed in adults, accounting for less than 10% of reported cases. Clinical manifestations are generally nonspecific, and imaging studies are essential for diagnosis and therapeutic planning. We report the case of a 30-year-old female patient with chronic pelvic pain and sacrococcygeal discomfort. Pelvic magnetic resonance imaging revealed a large solid–cystic, multilobulated, and septated lesion with predominantly adipose content, located in the presacrococcygeal space, measuring 8.3 × 10.1 × 9.6 cm, without bone invasion or gynecological involvement. The main diagnostic hypothesis was a mature sacrococcygeal teratoma, with indication for elective surgical resection. A systematic review of the literature was conducted in accordance with PRISMA 2020 guidelines and Cochrane methodology, including 15 studies with 28 adult patients. There was a predominance of females (82.1%), with ages ranging from 19 to 56 years. Pelvic or sacrococcygeal pain was the most frequent symptom (67.8%), and magnetic resonance imaging was used in all cases. All patients underwent surgical resection, with coccygectomy performed in 64.2%, without severe complications or recurrence in cases followed after coccygectomy. Sacrococcygeal teratomas in adults are rare entities that require a high degree of clinical suspicion and imaging investigation. This case reinforces the role of magnetic resonance imaging in the differential diagnosis of pelvic masses and supports complete surgical resection, with or without coccygectomy, as the treatment of choice. The absence of coccygectomy was associated with a higher risk of recurrence during long-term follow-up, although not universally.

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## 1. Introduction

Sacrococcygeal teratomas are germ cell tumors derived from pluripotent cells, characterized by the presence of ectodermal, mesodermal, and endodermal tissues in varying proportions [1,2]. Although they represent the most common congenital tumor in neonates, their occurrence in adults is extremely rare, accounting for less than 10% of reported cases, with a predominance in females [3]. In the adult population, most cases are diagnosed incidentally, either through imaging studies performed for other reasons or during the investigation of nonspecific compressive symptoms, such as pelvic pain, constipation, or urinary disturbances [4,5]. Unlike the neonatal context, in which there is a higher risk of malignant transformation, malignant change in adults is rare, although it should always be considered in therapeutic planning [6].

From a diagnostic perspective, magnetic resonance imaging plays a central role in lesion characterization, as it allows assessment of the relationship with the sacral and coccygeal bony structures, as well as identification of solid, cystic, or adipose components,



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which are frequently observed in mature teratomas [7,8]. Computed tomography may also be useful, particularly in evaluating bone involvement and identifying calcifications [9]. The recommended treatment consists of complete surgical resection, preferably associated with coccygectomy, since removal of the coccyx reduces the risk of recurrence, even in cases without evident invasion [2]. The surgical approach should be defined according to the location and extent of the lesion and may involve abdominal, posterior, or combined approaches [5].

Despite the rarity of this condition, individual case reports provide relevant information regarding clinical presentation, differential diagnosis, and management strategies. In the present study, we describe the case of a young patient with a presacrococcygeal expansile lesion compatible with a mature teratoma, diagnosed by magnetic resonance imaging and followed postoperatively, in addition to performing a literature review aimed at synthesizing the main published findings on sacrococcygeal teratomas in adults.

## 2. Methods

This literature review was prospectively registered. The study followed the PRISMA 2020 guidelines for systematic reviews and the Cochrane methodology applicable to observational studies and case reports [10,11].

### 2.1 Eligibility criteria

Case reports and case series describing sacrococcygeal teratoma in adult patients aged 18 years or older were considered eligible, provided the diagnosis was confirmed by imaging studies, surgical findings, or histopathological examination. Studies were included if they reported information on demographic data, clinical presentation, imaging examinations performed, lesion characteristics, therapeutic approach, and clinical outcomes. Cases involving pediatric or neonatal patients, experimental studies, narrative reviews without original case descriptions, and conference abstracts lacking complete clinical data were excluded.

### 2.2 Search strategy, study selection, and data extraction

Searches were conducted in the PubMed, Embase, Scopus, and LILACS databases, from their inception until July 2025. The search strategy combined controlled MeSH and Emtree terms with free-text keywords, including “sacrococcygeal teratoma” OR “pre sacral teratoma” OR “retrorectal teratoma” AND “adult” OR “adults.” Reference lists of the included studies and of previous reviews were manually screened to identify additional publications.

Study selection was carried out in two stages. Initially, titles and abstracts were screened. Subsequently, full-text articles were reviewed to confirm eligibility. Two reviewers independently performed study selection and data extraction. Any disagreements were resolved by consensus or, when necessary, with the involvement of a third reviewer.

Extracted data included patient characteristics, such as age, sex, and comorbidities; clinical presentation, including symptoms, duration, and physical findings; diagnostic workup, with imaging modalities used and their main findings; lesion characteristics, such as size, location, involvement of adjacent structures, and histopathological findings; treatment, including the surgical approach employed (abdominal, posterior, or combined) and associated procedures such as coccygectomy or partial bone resection; and outcomes, including postoperative course, complications, recurrence, and follow-up duration.

### 2.3 Outcomes

The primary outcome was confirmation of the diagnosis of sacrococcygeal teratoma in adult patients. Secondary outcomes included clinical presentation, diagnostic methods

used, surgical modality applied, occurrence of postoperative complications, and tumor recurrence.

## 2.4 Methodological quality assessment

The methodological quality of the case reports and case series was assessed independently by two reviewers using the JBI Critical Appraisal Checklist for Case Reports (Moola et al., 2020). Aspects evaluated included clarity in the description of the patient's history, temporal sequence of events, details of the intervention performed, and clinical outcomes. The risk of bias was classified as low, moderate, or high.

## 3. Case Report

### 3.1 Patient information

A 30-year-old female patient, born and residing in Manaus, Amazonas, Brazil. Occupation not reported. Christian religion. Past medical history negative for known comorbidities and no previous surgical history. Obstetric history included two prior full-term pregnancies, both resulting in vaginal deliveries, with no history of abortions (G2P2A0).

### 3.2 Clinical history and initial presentation

In February 2025, the patient was referred to for investigation of intermittent pelvic pain associated with discomfort in the sacrococcygeal region. There were no reports of weight loss, bleeding, or significant urinary changes. Gynecological physical examination revealed no abnormalities, with the uterus and adnexa free of palpable masses.

Due to persistence of symptoms, pelvic magnetic resonance imaging was requested and performed on February 6, 2025. The examination demonstrated preserved uterus and ovaries, with no evidence of adnexal masses; however, it identified a large solid and cystic expansile lesion, multilobulated and septated, with a predominance of adipose components, located in the midline presacrococcygeal space. The lesion measured approximately  $8.3 \times 10.1 \times 9.6$  cm, with an estimated volume of  $418.5 \text{ cm}^3$ , and was inseparable from the sacral and coccygeal structures, without evidence of bone invasion. Anterolateral displacement of the rectum to the right was observed, without signs of luminal obstruction. The main diagnostic hypothesis suggested was a mature sacrococcygeal teratoma. Molecular and genetic tests showed results consistent with a mature teratoma.

### 3.3 Management and follow-up

The patient was evaluated in the outpatient setting and electively admitted for surgical planning. The therapeutic plan defined by the multidisciplinary team included surgical resection of the lesion, with the possibility of coccygectomy depending on intraoperative findings. At the time of submission of this report, the patient was under late postoperative follow-up, with no additional complications reported.

### 3.4 Clinical summary

The main information is summarized in Table 1, including demographic data, clinical presentation, complementary examinations, and planned management.

### 3.5 Subsequent symptoms and physical examination findings

The patient reported intermittent pain in the sacrococcygeal region, described as a sensation of pressure, associated with nonspecific pelvic discomfort. Symptoms were exacerbated after prolonged periods in a seated position. She denied fever, changes in bowel habits, weight loss, or other systemic symptoms. On physical examination, there was mild pain on deep palpation of the hypogastric and sacrococcygeal regions, with no signs of peritoneal irritation. Gynecological examination revealed preserved uterus and adnexa, with no palpable masses. The patient was in good general condition and afebrile.

**Table 1.** Clinical summary of the adult patient with sacrococcygeal teratoma.

Variable	Information
Age	30 years
Sex	Female
Place of birth / Residence	Manaus, Amazonas, Brazil
Past medical history	No comorbidities; no previous surgeries
Obstetric history	G2P2A0 (two pregnancies, two vaginal deliveries, no abortions)
Clinical presentation	Intermittent pelvic pain; sacrococcygeal discomfort; no weight loss or urinary changes
Physical examination	Normal gynecological examination; no palpable masses
Imaging study	Pelvic magnetic resonance imaging (02/06/2025)
Imaging findings	Solid–cystic expansile lesion, multilobulated and septated, with predominance of adipose component, measuring 8.3 × 10.1 × 9.6 cm (418.5 cm <sup>3</sup> ), located in the presacrococcygeal space, inseparable from the sacrum/coccyx, without bone invasion, displacing the rectum to the right
Differential diagnosis	Sacrococcygeal teratoma (most likely); ovarian origin ruled out
Management	Elective surgical planning; lesion resection with possible coccygectomy
Current outcome	Late postoperative period; no complications; ongoing outpatient follow-up every 3 months with MRI

### 3.6 Imaging and laboratory examinations and final diagnostic hypothesis

Magnetic resonance imaging revealed a presacrococcygeal expansile lesion with a solid–cystic appearance (Figures 1 and 2), with a predominance of adipose components, consistent with a mature sacrococcygeal teratoma, with no evidence of bone invasion or uterine or ovarian involvement. The postoperative anatomopathological examination confirmed the diagnosis of a mature cystic teratoma. Laboratory tests showed values within normal ranges, with alpha-fetoprotein of 1.8 ng/mL, CEA of 1.0 ng/mL, CA 19-9 of 9 U/mL, and CA 125 of 13.6 U/mL, with no elevation of tumor markers.

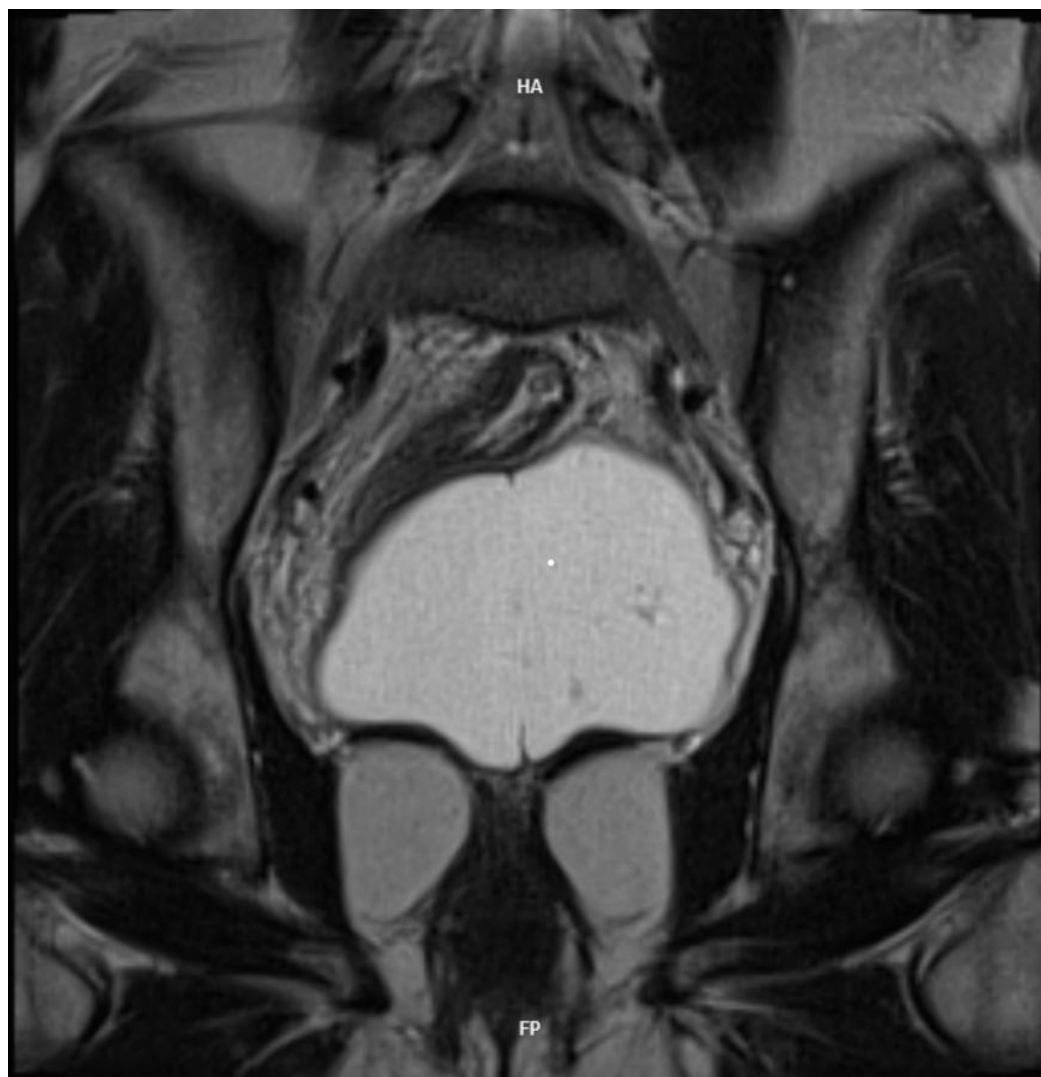
### 3.6 Therapeutic intervention

The patient was electively admitted for surgical treatment. The therapeutic plan consisted of complete resection of the lesion, without the need for associated coccygectomy, as there were no imaging findings suggestive of bone infiltration, a fact confirmed intraoperatively by the absence of adhesions or bone invasion. The procedure was performed at a specialized center, with the involvement of a multidisciplinary oncologic surgery team.

The surgery was performed on April 29, 2025, by the oncologic surgery team using a laparoscopic approach. Surgical exploration revealed a retrorectal and presacral mass measuring approximately 9 cm, containing serous fluid, hair, and fat, with no signs of sacrococcygeal bone invasion. Bilateral right and left pararectal mobilization was performed, with bilateral identification of the hypogastric nerves using a Ligasure Maryland device, followed by dissection down to the level of the anorectal levator muscles. The lesion was placed in an endobag, after which meticulous hemostatic review was carried out, with interposition of Surgicel (three units), in addition to placement of a Blake drain in the abdominal cavity. The procedure was completed without complications, with complete and safe removal of the surgical specimen via endobag. The patient was transferred

to the post-anesthesia care unit and, after four hours, was discharged to a regular ward bed without interurrences.

**Figure 1.** Pelvic magnetic resonance imaging demonstrating a large solid–cystic expansile lesion in the presacrococcygeal space, multilobulated and septated, with predominance of adipose components, measuring  $8.3 \times 10.1 \times 9.6$  cm, with no rectal or bone invasion.

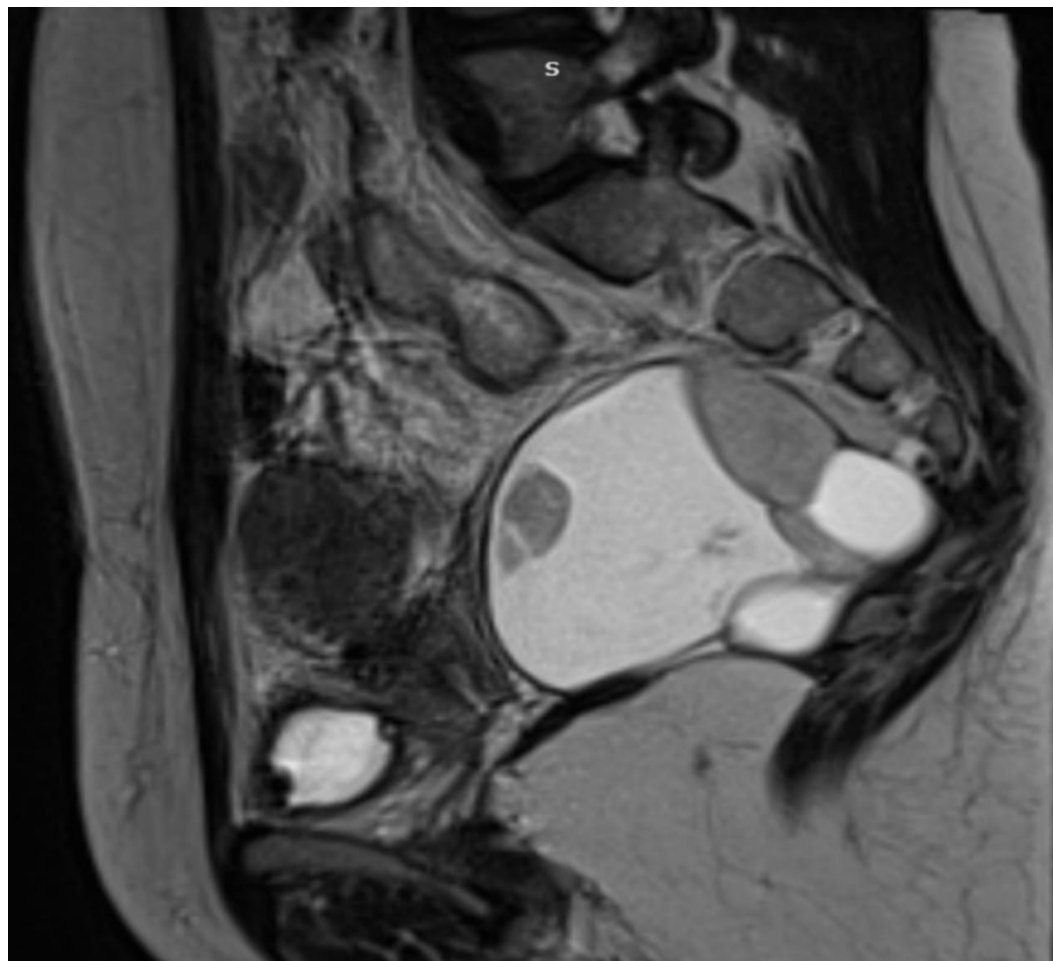


### 3.7 Postoperative course, follow-up, and diagnostic confirmation

The patient showed a favorable postoperative course during the immediate postoperative period in the ward and was discharged from the hospital on May 3, 2025, for outpatient follow-up. The Blake drain was removed prior to discharge due to low serous fluid output. At the time of submission of this report, the patient was in the late postoperative period, with no additional clinical complications, such as intra-abdominal hemorrhage, abdominal pain, vomiting, fever, or bowel or urinary dysfunction.

The therapeutic plan included postoperative outpatient follow-up with clinical evaluation, review of the histopathological examination, and imaging surveillance to screen for possible recurrence, every three months during the first year and subsequently every six months. At the second postoperative follow-up visit, the patient returned with the biopsy results of the lesion, which confirmed the diagnosis of a mature cystic teratoma.

**Figure 2.** Pelvic magnetic resonance imaging demonstrating a large solid–cystic expansile lesion in the presacrococcygeal space, multilobulated and septated, with predominance of adipose components, measuring  $8.3 \times 10.1 \times 9.6$  cm, on coronal T1-weighted imaging, with no rectal or bone invasion.



#### 4. Literature Review

##### 4.1 Study selection

The study selection flowchart, presented in Figure 2, summarizes the screening process of the present review. A total of 482 records were identified through searches in the PubMed (211), Embase (143), Scopus (112), and LILACS (16) databases. After removal of 92 duplicates, 390 records were screened by title and abstract, resulting in the exclusion of 328 studies for not addressing adult cases or for not presenting original clinical data. A total of 62 articles were then assessed in full text, of which 47 were excluded for not meeting the eligibility criteria, including pediatric or neonatal populations, narrative reviews, lack of diagnostic confirmation, or incomplete data. Ultimately, 15 studies met the established criteria and were included in the qualitative synthesis of the review.

##### 4.2 Characteristics of the included studies

The selected studies consisted of 12 individual case reports and three case series [5,8,9,12–23]. Sample size ranged from one to five patients per study, totaling 28 cases of sacrococcygeal teratoma in adults. Most patients were female, accounting for 82.1% of cases, with ages ranging from 19 to 56 years. In all studies, the diagnosis was confirmed by imaging examinations, followed by surgical resection with histopathological analysis (Table 2).

**Figure 3.** Pelvic magnetic resonance imaging demonstrating a large solid–cystic expansile lesion in the presacrococcygeal space, multilobulated and septated, with predominance of adipose components, measuring 8.3 × 10.1 × 9.6 cm on coronal T2-weighted imaging, with no rectal or bone invasion.



The interval between symptom onset and diagnosis ranged from three months to seven years. The most frequent clinical presentation was pelvic or sacrococcygeal pain or discomfort, observed in 67.8% of cases [5,8,9,15–18,20], followed by constipation or intestinal compressive symptoms, present in 21.4% of patients [12,14,19,22]. In a minority of cases (10.7%), detection was incidental during radiologic examinations performed for other indications [13,21]. From a diagnostic standpoint, magnetic resonance imaging was used in 100% of cases as the primary method for diagnostic definition and surgical planning. Computed tomography was employed in 71.4% of reports, mainly for assessment of calcifications and possible bone involvement [5,14,19,22]. Ultrasonography had limited utility and was used only as an initial method in 46.4% of cases.

**Table 2.** Characteristics of the included studies on sacrococcygeal teratoma in adults.

Reference	Country	Age (years)	Sex	Main symptoms	Diagnostic exams	Surgical approach	Histological finding	Outcome
[12]	Egypt	42	F	Constipation, pelvic pain	CT, MRI	Laparotomy coccygectomy	+ Mature teratoma	Discharged without complications

[13]	Turkey	33	F	Asymptomatic (incidental finding)	MRI	Isolated resection	Mature teratoma	No recurrence at 2 years
[14]	Turkey	29	F	Palpable pelvic mass	US, CT, MRI	Laparotomy + resection	Mature teratoma	Discharged without complications
[15]	Iran	25	F	Chronic sacral pain	MRI	Posterior approach + coccygectomy	Mature teratoma	No recurrence at 3 years
[16]	Nigeria	35	F	Lumbosacral pain, constipation	CT, MRI	Combined resection	Mature teratoma	Discharged without complications
[17]	China	40	M	Sacrococcygeal pain	CT, MRI	Posterior resection + coccygectomy	Mature teratoma	No recurrence at 5 years
[5]	USA	52	F	Retrorectal mass	MRI	Laparotomy + coccygectomy	Mature teratoma	Favorable outcome
[8]	China	37	F	Constipation, pelvic pain	CT, MRI	Combined approach	Mature teratoma	No recurrence at 2 years
[18]	India	28	F	Sacral pain, urinary disturbance	MRI	Posterior resection + coccygectomy	Mature teratoma	Discharged without complications
[19]	United Kingdom	44	F	Chronic constipation	MRI	Isolated resection	Mature teratoma	18-month follow-up without recurrence
[20]	Pakistan	30	F	Progressive pelvic pain	CT, MRI	Laparotomy + coccygectomy	Mature teratoma	Discharged without complications
[21]	Brazil	31	F	Asymptomatic (incidental finding)	MRI	Isolated resection	Mature teratoma	No recurrence at 1 year
[22]	China	56	F	Constipation, sacral pain	CT, MRI	Laparotomy + coccygectomy	Mature teratoma	No recurrence at 4 years
[23]	Turkey	21	F	Palpable sacral mass	MRI	Posterior resection	Mature teratoma	Discharged without complications

[9]	France	46	F	Pelvic pain, defecatory difficulty	MRI	Combined resection	Mature teratoma	2-year follow-up without recurrence
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Legend: M, Male; F, Female.

Treatment was exclusively surgical, with complete resection associated with coccygectomy in 64.2% of cases [5,8,9,15,18,20], whereas isolated lesion resection without removal of the coccyx was performed in 35.8% of patients [12–14,17,21]. None of the studies reported severe postoperative complications, such as hemorrhage, chronic pain, fecal or urinary incontinence, inadvertent bowel perforation, or ureteral injury. Follow-up periods ranged from six months to five years, with complete symptom resolution in all patients and no tumor recurrence in cases in which coccygectomy was performed as part of the procedure.

### 4.3 Thematic synthesis of findings

#### 4.3.1 Clinical presentation

Pelvic and/or sacrococcygeal pain, of a chronic or intermittent nature, were the predominant symptom [5,9,15,18,20]. Less frequently, cases presenting chronic constipation, a palpable mass, or compressive urinary symptoms were described [12,19,22]. In asymptomatic patients, detection occurred incidentally during imaging examinations requested for other indications [13,21].

#### 4.3.2 Imaging diagnosis and laboratory examinations

Magnetic resonance imaging was the main tool for lesion characterization, allowing identification of solid, cystic, and adipose components, as well as evaluation of the relationship with sacral and coccygeal structures. Computed tomography proved to be complementary in identifying calcifications and excluding bone invasion. Ultrasonography showed low accuracy for the evaluation of deep presacral tumors.

#### 4.3.3 Therapeutic management

Complete resection associated with coccygectomy was the most commonly used treatment and was related to the absence of recurrence in cases with long-term follow-up. In resections without coccyx removal, although no recurrences were observed during the follow-up period, the literature recommends caution, considering the higher risk of local recurrence.

## 5. Discussion

Sacrococcygeal teratomas are germ cell tumors derived from pluripotent cells and are rarely diagnosed in adults. Although they represent the most common congenital neoplasm in neonates, their occurrence after childhood accounts for less than 10% of reported cases [2]. The present case describes a young patient with a radiological diagnosis of a large presacrococcygeal mass, without evidence of bone invasion, compatible with a mature teratoma, who was scheduled for elective surgical resection.

### 5.1 Comparison with the literature

The synthesis of the 15 included studies [5,8,12,14–24] shows that most adult patients with sacrococcygeal teratoma are female (82.1%), with ages ranging from 19 to 56 years. The predominant clinical presentation was chronic pelvic or sacrococcygeal pain, observed in approximately two thirds of cases, followed by intestinal or urinary compressive symptoms (21.4%). In about 10% of cases, the finding was incidental on imaging examinations. Our case fits this clinical profile, with mild pelvic pain and absence of systemic symptoms, reinforcing the importance of considering differential diagnoses in young patients with nonspecific complaints.

## 5.2 Diagnostic aspects

In the literature, magnetic resonance imaging is consistently described as the examination of choice, as it allows detailed characterization of the solid, cystic, and adipose components of the lesion, in addition to evaluating its relationship with the sacral and coccygeal structures [8,22]. Computed tomography assists in the detection of calcifications and in the assessment of possible bone erosion, described in some cases. Ultrasonography, in turn, has limitations and is mainly useful for the initial suspicion of superficial pelvic masses. In the reported case, magnetic resonance imaging was sufficient for adequate lesion characterization, with no need for additional examinations.

Some germ cell tumors may produce hormones detectable in serum, which act as sensitive and variably specific tumor markers for certain histological components. Human chorionic gonadotropin is associated with embryonal cell carcinomas, ovarian choriocarcinomas, mixed germ cell tumors, and some dysgerminomas. Alpha-fetoprotein is mainly related to yolk sac tumors, embryonal cell carcinomas, polyembryonal carcinomas, mixed germ cell tumors, and some immature teratomas, whereas most dysgerminomas present normal levels of this marker. Lactate dehydrogenase is frequently elevated in dysgerminomas. Together, these markers assist in differentiating between benign and malignant lesions.

## 5.3 Surgical management

The literature indicates complete lesion resection associated with coccygectomy as the most recommended approach, as it reduces the risk of local recurrence [5,9,15]. In the present review, 64.2% of patients underwent coccygectomy, whereas in 35.8% resection was performed without coccyx removal. In cases with long-term follow-up, the absence of coccygectomy was associated with a higher risk of recurrence, although this finding was not universally reported. In the case presented, the surgical plan did not include coccygectomy, since imaging studies did not demonstrate adhesions or signs of bone infiltration.

## 5.4 Pathophysiological considerations

The development of sacrococcygeal teratoma in adults is attributed to the persistence of totipotent germ cells in remnants of the Hensen's node, located in the presacral region. Although most of these tumors are benign, there is a low but recognized risk of malignant transformation, which justifies the indication for systematic surgical resection [2,6]. Slow growth and deep anatomical location contribute to delayed diagnosis, often established after years of mild or nonspecific symptoms, as observed in the present case.

## 5.5 Implications of the present case

Our report reinforces the importance of magnetic resonance imaging and molecular markers in the characterization of presacrococcygeal masses, as well as the need for accurate differentiation from adnexal tumors in young women, and supports complete surgical resection as a curative strategy. The absence of bone invasion in this case favors a good prognosis, provided that resection is complete and, when indicated, associated with coccygectomy.

## 5.6 Clinical implications

The present case highlights three relevant points for clinical practice. First, magnetic resonance imaging should be considered the examination of choice and the main tool for characterization of presacrococcygeal masses, allowing differentiation of teratomas from other pelvic neoplasms, especially in young women, in whom the differential diagnosis includes adnexal tumors. Second, the importance of coccygectomy should be emphasized, as the association of tumor resection with coccyx removal reduces the risk of local recurrence, even in the absence of evident bone invasion, and should be considered during

surgical planning. Third, the relevance of early diagnosis should be underscored, since investigation of chronic pelvic or sacrococcygeal pain, even when nonspecific, should include the hypothesis of adult teratoma, avoiding diagnostic delays and allowing curative treatment through complete resection.

#### 5.7 Limitations and research agenda

The literature was composed predominantly of isolated case reports, which limits generalization and more robust statistical analyses. There is no consistent data on specific predisposing factors, nor standardized diagnostic protocols. Prospective studies are unlikely due to the rarity of the condition; however, multicenter reviews may contribute to consolidating the available evidence and guiding clinical recommendations.

#### 4. Conclusion

Sacrococcygeal teratomas in adults are rare neoplasms that require a high degree of clinical suspicion and appropriate investigation using imaging methods. Magnetic resonance imaging represents the examination of choice for lesion characterization and for defining the surgical strategy and may be complemented by molecular or genetic tests in selected situations. Complete resection remains the recommended management, preferably associated with coccygectomy, as this approach reduces the risk of local recurrence, especially in cases with bone involvement or the presence of adhesions. Definitive diagnosis is established through histopathological examination of the resected lesion.

The present case contributes to the literature by reinforcing the importance of differential diagnosis of pelvic masses in young women, highlighting the role of advanced imaging and appropriate surgical management as determining factors for a favorable prognosis. In patients without evidence of bone involvement or adhesions, as in the present case, isolated tumor resection may be considered a viable alternative. However, data from the literature demonstrate that patients undergoing coccygectomy have lower rates of local recurrence. In cases with long-term follow-up, the absence of coccygectomy has been associated with a higher risk of recurrence, although this finding is not universally reported.

Previous studies indicate that most adult patients with sacrococcygeal teratoma are female, accounting for approximately 82.1% of cases, with ages ranging from 19 to 56 years. The predominant clinical presentation is chronic pelvic or sacrococcygeal pain, observed in about two thirds of patients. The use of molecular and genetic markers may assist in differentiating between benign and malignant lesions. In the case described, the patient remains under quarterly outpatient follow-up with magnetic resonance imaging during the first year and, if asymptomatic and without signs of recurrence, follow-up will be extended to every six months thereafter.

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